EXHIBIT 52

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

RACHEL COLANGELO and KATHLEEN PARADOWSKI, individually and on behalf of a class of similarly situated individuals, Plaintiffs, v. CHAMPION PETFOODS USA, INC. and CHAMPION PETFOODS LP, Defendants.	Case No. 6:18-cv-01228

EXPERT REPORT

OF

STEFAN BOEDEKER

Managing Director, Berkeley Research Group

February 24, 2021

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1 Introduction

1.   In this section I present my qualifications, describe my understanding of the case background and of my assignment, before describing the materials I considered in forming my opinions.

1.1   Qualifications

2.   I am a Statistician and an Economist. I received a Bachelor of Science degree in Statistics and a Bachelor of Arts degree in Business Administration from the University of Dortmund/Germany in 1988. I received a Master of Science degree in Statistics from the University of Dortmund/Germany in 1988, and I received a Master of Arts degree in Economics from the University of California, San Diego in 1992. I also completed Ph.D. requirements (except dissertation) in Economics at the University of California, San Diego.

3.   I am a Managing Director at the Berkeley Research Group ("BRG") based at 550 South Hope Street, Suite 2150, Los Angeles, CA, 90071. Prior to joining BRG, I was a Partner at Resolution Economics. I also held Managing Director positions at Alvarez & Marsal, Navigant Consulting, and LECG. I held partner-level positions at Deloitte & Touche LLP, PricewaterhouseCoopers LLP, and Arthur Andersen LLP. At the three latter firms, I was responsible for the Economic and Statistical Consulting group on the West Coast. Before moving to the United States to attend graduate school, I worked as a statistician for the German Government from 1986 to 1989.

4.   For over 25 years, my work has focused on the application of economic, statistical, and financial models to a variety of areas. This includes providing solutions to business problems, supporting complex litigation in a consulting and expert witness role, and conducting economic impact studies in a large variety of industries including, but not limited to, healthcare, retail, grocery, manufacturing, technology, entertainment, manufacturing, automotive, energy and utilities, hospitality, and federal, state, and local government agencies.

5.   I have extensive experience designing and conducting surveys and conjoint studies, as well as statistically analyzing results from surveys in both the litigation context as a consultant and/or designated expert and the non-litigation context as a statistical or economic consultant. I

have issued numerous expert and rebuttal reports dealing with surveys, conjoint analysis, and statistical sampling related issues. I have been deposed on numerous occasions and have testified in court regarding surveys, conjoint studies, and statistical sampling-related issues.

6.   I do not have an opinion one way or the other about the allegations in this case. Instead, I have relied only on my experience and expertise in designing surveys and conjoint studies and applying economic theory and statistical methodologies based on the assumptions provided herein as to the alleged misrepresentations and/or omissions at issue in this litigation. These assumptions are grounded in the allegations made in the Second Amended Class Action Complaint, dated April 24, 2020 (the "Complaint")[1], and documents from this case provided to me by Plaintiffs' counsel.

7.   All the facts and circumstances set forth in this report are known to me personally and I am prepared to testify to them if called upon to do so. My *curriculum vitae*, which includes matters in which I have testified, is attached to this report as **Exhibit A**. BRG is being compensated for its work on this matter based on an agreed upon hourly billing rate schedule. My hourly billing rate for professional services related to this case is $750 and the hourly billing rates of BRG staff supporting me on this engagement range from $150 to $640. BRG's payment in this matter is not contingent upon my opinions or the outcome of this litigation.

1.2   Case Background

8.   The Complaint alleges that Defendants, Champion Petfoods USA, Inc. and Champion Petfoods LP ("Champion" or "Defendants"), marketed their dry dog food products using misleading packaging claims and misleading omissions, concerning the quality and characteristics of their dog food diets and the ingredients used to make them. [2]

9.   The Complaint alleges that Defendants intentionally labeled their dog food to include packaging claims that targeted consumers who were willing to pay premium prices based on

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[1]   Second Amended Class Action Complaint, Colangelo et al. v. Champion Petfoods USA, Inc. and Champion Petfoods LP, United States District Court for the Northern District of New York, Case No. 18-cv-01228-LEK-DEP, dated April 24, 2020.

[2]   Complaint, ¶1.

Defendants' representations and warranties that their dog food contained fresh, local, or regionally sourced ingredients.

10.   The Complaint alleges that these claims were misleading and fraudulently omitted that Defendants' dog foods had a risk of containing undisclosed and non-conforming ingredients and contaminants, such as heavy metals, non-fresh ingredients, non-regional ingredients, and Bisphenol A (BPA).

11.   The Complaint alleges that had Plaintiffs and putative class members in New York (the "Class") known Defendants' misleading packaging claims and material omissions, Plaintiffs and the Class would not have selected and purchased Defendants' dog food at the purchase prices paid, and certainly would not have paid a premium over non-premium dog food and hence, have been thereby damaged.

1.3   Assignment

12.   I was retained by counsel for the Plaintiffs to:

a. Ascertain if it is possible to quantify economic losses to consumers, including Plaintiffs and the Class, attributable to the purchase of a product advertised with misrepresentations and omissions, and if so, to provide a framework for the computation of class-wide damages.

b. Explain and outline an economic model that enables the quantification of economic losses suffered by Plaintiffs and the Class, as a result of having purchased a product that is other than as represented by Defendants.

c. Explain and outline a statistical methodology to calculate class-wide damages if Defendants had disclosed misrepresentations and omissions at the point of purchase.

d. Conduct an empirical analysis and apply the methodology to estimate class-wide damages.

e. Conduct consumer analysis to verify empirically consumers' understanding of the alleged misrepresentations and omissions as well as whether the alleged misrepresentations and omissions would affect consumers' purchasing.

1.4   Materials Considered

13.   In forming my opinions for this report, I have considered the documents listed in **Exhibit B** to this report and all materials cited in the text and footnotes of this report.

1.5   Report Outline

14.   The remainder of this Expert Report is structured as follows:

   a. Section 2 describes the background to my report, including an overview of the Plaintiffs' allegations and the products at issue.

   b. Section 3 presents the theoretical framework of the economic loss model based on consideration of supply and demand.

   c. Section 4 discusses conjoint analysis as a methodology to quantify the impact of changing market conditions on consumer demand.

   d. Section 5 discusses the design and implementation of the conjoint study I conducted.

   e. Section 6 summarizes the results of my conjoint study and presents an estimate of damages per bag of Defendant's dog food.

   f. Section 7 presents an estimate of class-wide damages. In this section, due to a lack of data available from Defendant, I offer assumptions to estimate the retail revenue at issue.

   g. Section 8 presents the results of an expectation survey that gauges consumers' understanding of key terms and how misrepresentations and omissions affect consumers' propensity to purchase ceteris paribus.

   h. Section 9 summarizes my conclusions concludes that the results from a properly designed and implemented conjoint study reliably quantified class-wide economic losses and that the properly designed and implemented expectation survey measured consumers' understanding and propensity to purchase.

2   Background

15.   In the following I describe my understanding of the claims against Defendant in New York and the products at issue.

2.1   Claims Against Champion

16.   The Complaint alleges that Defendants made a number of misrepresentations and omissions on their dog food packaging. Plaintiffs' counsel instructed me to consider the following misrepresentations and omissions based on the Complaint:

   a.   Misrepresentations

      i.   Biologically Appropriate;

      ii.   Fresh Regional Ingredients;

      iii.   Delivering Nutrients Naturally.

   b.   Omissions

      i.   Heavy metals (Lead, Arsenic, Mercury, Cadmium);

      ii.   Bisphenol A (BPA);

      iii.   Regrinds;

      iv.   Expired ingredients.

2.2   Products at Issue

17.   The dog food products at issue (the "Products") are two (2) dry dog food diets[3] manufactured by Defendants and marketed and sold under Acana brand (Table 1).[4]

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[3]   In the Complaint, the term "diet" is used to refer to a dog food product variety with specific ingredient combination from a line of a brand. I follow this convention in this report.

[4]   Complaint, ¶13; Deposition Transcript of Kathleen Paradowski at 34:24-35:10, 44:24-45:4, 53:24-62:15.

Table 1: Products at Issue

Brand	Diet
Acana	Free Run Poultry
	Meadowlands

Source: Complaint, ¶13; Deposition Transcript of Kathleen Paradowski at 34:24-35:10, 44:24-45:4, 53:24-62:15.

18.   In order to estimate damages, we need to know or estimate how much consumers paid for the Products and how much they spent on the Products overall. Therefore, as data on retail sales were not available, I analyzed Defendants' historic sales and pricing data.[5] The data covers sales from July 2014 to December 2018. I analyzed sales from June 2016 to December 2018.[6]

19.   Table 2 and Table 3 below show the sales of Defendant's products by bag sizes during the analysis period. Defendant had provided the sales data in two excel files that were structured differently and contained varying descriptions. However, the data did not provide the brand (Acana or Orijen) of each item and I had to make assumptions based on the descriptions provided. I also had to make assumptions on the bag sizes. If and when the Defendant provides better data I might re-calculate the aggregated data in Table 2.

Table 2: Sales of the Products by Size, Acana, Jun 2016 – Dec 2018

Product (Diet)	Package Size in LB				Total in USD
	.75	4.5	13	25	
Free Run Poultry	237,667	1,970,474	3,387,996	15,525,479	21,121,616
Meadowlands	383,638	2,345,508	4,210,552	16,560,171	23,499,869
Grand Total	**621,305**	**4,315,982**	**7,598,548**	**32,085,649**	**44,621,484**

Source: BRG analysis on CPF0017614.xlsx and CPF0017743.xlsx.

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[5]   CPF0017614.xlsx, CPF0017743.xlsx, CPF2117040.pdf. The sales data in the two xlsx files were not structured the same and contained varying descriptions. Therefore, I made some assumptions to merge the data files into a single sales dataset and analyze sales by diet. The result of this analysis could change if more information on the data becomes available.

[6]   I understand the main class period is June 1, 2016 to the present. I analyzed sales from June 2016 to December 2018, which is the latest date of available data. Should the class period change in any way, my analysis can easily be adjusted to determine the sales for any time period.

20.   As shown in Table 2, Defendants generated approximately $45 million from sales of the Products. I understand that these revenues are revenues generated with distributors or retailers. Retail stores add a markup to the price they pay the manufacturer. Assuming a gross profit margin of 40%[7] and assuming that the data provided by Defendant is complete and accurate, consumers across the United States spent approximately $74 million on purchases of the Products.[8]

21.   Defendants did not provide information on retail sales in general and on sales to customers in New York in particular. In order to estimate sales in New York, I therefore revert to estimates published by the American Veterinary Medical Association (AVMA)[9]. Combining its own survey data with the sampling weights in the 2016 Current Population Survey, AVMA estimates that households in the United States owned 76.8 million dogs as of December 2016, including 2.858 million in New York.[10] I apply the share of New York, 3.7% in the total number of dogs, to estimate the share of the Defendants' revenues ($74 million) that is attributable to New York and, after accounting for the gross profit margin of retailers, estimate that consumers in New York spent $2.752 million on the Products from June 2016 to December 2018.

Table 3: Dog Population in U.S. and New York

Metric	United States	New York
Number of Households (1,000s)*	125,819	7,849
Percent of Households who Owned Dogs	38.4%	27.00%
Number of dog-Owning Households (1,000s)	48,255	2,116
Average Number of Dogs per Household	1.6	1.4
Dog Population (1,000s)	76,811	2,858
Share in Dog Population	100.0%	3.70%

Source: American Veterinary Medical Association (2018)

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[7]   The gross profit margin of pet retail stores or pet supplies industry is reported to be 35%-45% in various market research reports. For example, 35-45% in 2016-2020 (Research and Markets. (2016). *Global Pet Care Market 2016-2020.*); 38.6%-43.7% in 2016-2019 (The Risk Management Association. (2019). *Annual Statement Studies, 2019-2020.*).

[8]   A profit margin of 40% implies that the revenue is 1/(1-0.4), or approximately 1.67 times the cost. $45 million * 1.67 = $74 million (after rounding).

[9]   American Veterinary Medical Association. (2018). *Pet Ownership and Demographics Sourcebook 2017-2018 Edition.* American Veterinary Medical Association.

[10]   *Ibid.* p. 40.

22.   This basic estimate most likely underestimates the share of New York in total retail revenue because the estimate assumes that Defendants sell their products in all 50 states. The estimate also does not take into account income differences between states and possible differences in spending on dog food by state. While these estimates are not perfect, they are based on my best efforts with the data available. I will adjust my estimates if and when more complete data become available.

3   Theoretical Framework of Economic Loss

23.   I understand that the legal theory in this matter requires me to measure the value received versus the value perceived at the time and place of purchase.[11]

24.   As described in *Comcast*, the first step in a damages study is the translation of the legal theory of the harmful event into an analysis of the economic impact of that event.[12] Hence, in the following I first describe the economic framework in which I estimate damages in this case.

25.   The *Reference Guide on Estimation of Economic Damages* (the "Reference Guide")[13] describes the framework in which the damage to the plaintiff(s) is considered by comparing the Actual World to a hypothetical "but-for" world. Hence, defining the But-For World is key to estimating damages in many if not all litigation cases that require assessing monetary damage.

> *Because the but-for scenario differs from what actually happened only with respect to the harmful act, damages measured in this way isolate the loss of value caused by the harmful act and exclude any change in the plaintiff's value arising from other sources. Thus, a proper construction of the but-for scenario*

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[11]   Complaint, ¶163.

[12]   Comcast Corp. v. Behrend, No. 11-864 (Supreme Court of the United States.

[13]   Allen, M. A., Hall, R. E. & Lazear, V. A. (2011). Reference Guide on Estimation of Economic Damages. *Reference manual on scientific evidence*. The *Reference Manual on Scientific Evidence* assists judges in managing cases involving complex scientific and technical evidence by describing the basic tenets of key scientific fields. The Reference Manual is published by the Federal Judicial Center, the research and education agency of the judicial branch of the U.S. government.

and measurement of the hypothetical but-for plaintiff's value by definition includes in damages only the loss caused by the harmful act.[14]

26.   I understand the But-For-World to be the hypothetical world, where the purchasers of Defendants' dog food products had been informed at the time and place of purchase that the packaging of the products contained misrepresentations and omissions. I analyze the But-For-World in comparison with the Actual-World, which is the state of the world that we observed.

3.1   Economic Framework

27.   In developing the economic framework, I consider a producer, who maximizes profits Π:[15]

$$[\text{Eq. 1}] \qquad \max[\ \Pi = p*D(p) - C(D(p))\ ]$$

where p is the market price, $D(p)$ is the residual demand[16] at the market price p, and $C(D(p))$ is the cost function of the producer.

28.   Based on the product rule and the chain rule for derivatives, the derivative of the profit function Π with respect to p is given by $D(p) + D'(p) - C'(D(p)) * D'(p)$, and thus the First Order Condition to find the maximum profit can be written as:

$$[\text{Eq. 2}] \qquad D(p) + D'(p)*(p - C'(D(p))) = 0,$$

where D' and C' denote the first derivatives of the demand function D and the cost function, C respectively.

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[14]   *Ibid.* p. 432.

[15]   The following derivation is loosely based on Tirole, J. (1988). *The Theory of Industrial Organization*: MIT press, p. 68.

[16]   The residual demand curve is defined as the individual producer's demand curve, which is that portion of market demand that is not supplied by other producers in the market. In other words, the residual demand function is the market demand function minus the quantity supplied by other producers at each price. See, e.g., Varian, H. R. (2010). *Intermediate Microeconomics: Modern Approach* (8th ed.), pp. 504-506.

29.   Based on this First Order Condition, the price $\mathcal{P}$ and the volume $\mathcal{D}$ in the market equilibrium of the Actual World can be determined. This market equilibrium can also be observed in the market if information on market volumes and prices is available.

30.   Next, I will frame the appropriate But-For-World. If consumers perceive the product without the claim to be inferior to the product with the claim, then the demand at a given price will be lower:[17]

$$[\text{Eq. 3}] \qquad D_{\text{But-For}}(P) < D_{\text{Actual}}(P)$$

31.   The Reference Guide on Estimation of Economic Damages asks to "isolate the loss of value caused by the harmful act and exclude any change in the plaintiff's value arising from other sources."[18] This means that a new price P^* has to be found in the But-For-World such that the demand in the But-For-World equals the demand in the actual market equilibrium where $\mathcal{D}$ and $\mathcal{P}$ represent the Actual World equilibrium demand and price, respectively:

$$[\text{Eq. 4}] \qquad D_{\text{But-For}}(P^*) = \mathcal{D}$$

32.   Again, if consumers perceive the product without the claim to be inferior to the product with the claim, then P* will be smaller than $\mathcal{P}$. The price difference $\Delta = \mathcal{P} - P^*$ is the "price premium" that the consumer would pay for the product if the statements were true. Δ is the compensation to the consumers who paid $\mathcal{P}$ in the Actual World under the assumption that the statements on the label were true.

33.   The price-premium Δ can also be described as the Pigouvian[19] subsidy that increases consumption of the product in the But-For-World to the volume $\mathcal{D}$ of the Actual-World market equilibrium.

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[17]   Later in this Report, I will introduce the survey-based methodology of Choice Based Conjoint analysis as an empirical test to assess if the knowledge of the fact that a statement is misleading will lower the demand for the product.

[18]   Allen, M. A., Hall, R. E. & Lazear, V. A. (2011). Reference Guide on Estimation of Economic Damages. *Reference manual on scientific evidence*, p. 432.

[19]   Pigou, A. C. (1929). *The Economics of Welfare* (3rd ed.): Routledge.

34.   The manufacturer's profit function in the But-For-World, which includes the compensation to be paid to the consumers Δ^* $D_{But\text{-}For}(P^*)$ can be written as:

$$[\text{Eq. 5}] \qquad \Pi = p^* \, D_{But\text{-}For}(p) - C(\, D_{But\text{-}For}(p)\,) - \Delta * D_{But\text{-}For}(p)$$

35.   Note, that the cost function C(.) is the same in the But-For-World and in the Actual World. The First Order Condition for the producer's profit maximization in the But-For-World is given by:

$$[\text{Eq. 6}] \qquad D_{But\text{-}For}(p) + D'(p) * (\, p - C'\,) = 0$$

36.   The First Order Condition in the But-For-World is different from the First Order Condition in the Actual-World. In the But-For-World, the manufacturer faces a lower demand and – if it could - would set a different price which maximizes profits. Therefore, the manufacturer would achieve a different volume in the But-For-World.

37.   However, setting new profit-maximizing prices and volumes sold would contradict the postulate of the *Reference Guide on Estimation of Economic Damages* that the But-For-World should only correct for the harmful act. Allowing the profit-maximizing producer to change the product's volume sold after disclosing the mislabeling in the But-For-World would lead to a lower equilibrium volume in the But-For-World than in the Actual-World. The manufacturer's profit is irrelevant in false advertising cases, where only the value perceived versus the value received by consumers must be considered.[20]   Hence, there is no need for information on the cost structure of the manufacturer or the shape of its supply function.

38.   All solving [Eq. 4] requires is information on the shape of the But-For demand curve in the But-For-World.

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[20]   Note, that in patent infringement cases, and depending on the perspective, the profit of the patent holder or the profit of the patent infringer are the relevant variable to be analyzed in the But-For World. See Allenby, G., Rossi, P. E., Cameron, L., Verlinda, J. & Li, Y. (2017). Calculating Reasonable Royalty Damages Using Conjoint Analysis. *American Intellectual. Property Law Association Quarterly Journal, 45*(2), 233-254. and Cameron, L., Cragg, M. & Mcfadden, D. (2013). The Role of Conjoint Surveys in Reasonable Royalty Cases. Retrieved from https://www.law360.com/articles/475390/print?section=ip. However, patent litigation builds on a different underling legal framework than false advertising cases. Therefore, applying the same economic analysis as in patent cases would not be appropriate in false advertising cases.

39.   In this case, the number of bags of Dog Food that Defendants would have supplied and sold if in the But-For-World is the same as in the Actual World because the Reference Guide requires the expert to assume that "*the but-for scenario differs from what actually happened only with respect to the harmful act, damages measured in this way isolate the loss of value caused by the harmful act and exclude any change in the plaintiff's value arising from other sources.*"[21]

40.   I interpret the *Reference Guide* to require that I do not consider changes to the supply in the But-For World and that I consider that the supplied volume is the same in the But-For-World as in the Actual-World. Or in other words, the supplied volume in the But-For World cannot deviate from the actually supplied volume in the Actual World. Hence, the supply in the But-For World is fixed at the number of units sold in the Actual-World.

41.   Figure 1 presents this analysis graphically: Point A in Figure 1 is the market equilibrium in the actual world with the equilibrium price P^* and the equilibrium volume D^* on the Actual-World demand curve. The But-For demand curve is below the Actual-World demand curve as the disclosure at the point and time of purchase makes the product less attractive to consumers. Hence, for a given volume, consumers are willing to pay a lower price in the But-For-World with disclosure than in the Actual-World without disclosure. To fully compensate all purchasers for their economic losses, it is necessary to find the price point on the But-For World's demand curve that ensures that the same number of units that were sold in the Actual-World would also be sold in the But-For World. We move along the But-For demand curve (orange demand curve in Figure 1 below) until the volume sold is equal to the volume sold in the Actual-World (D^* in Figure 1 below). Point B on the But-For demand curve gives us the price at which purchasers would have purchased the volume D* in the but-for world knowing at the time and place of purchase that the manufacturer's claim was false. The vertical distance Δ between points A and B is equal to the compensation required to make all purchasers whole.

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[21]   Allen, M. A., Hall, R. E. & Lazear, V. A. (2011). Reference Guide on Estimation of Economic Damages. *Reference manual on scientific evidence*, p. 432.

Figure 1: Shifted Demand and Economic Loss
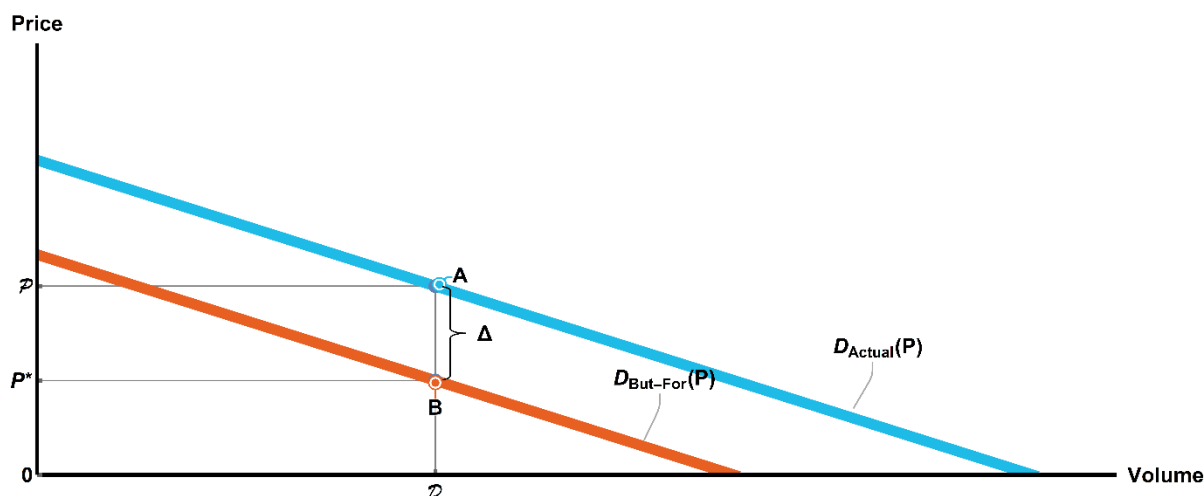
Source: Illustrative Example

42.   In my economic loss model, the But-For demand curve will be empirically determined based on a survey Choice Based Conjoint ("CBC") analysis, which I will discuss in detail in the next Section.

43.   The economic loss could be determined based on the willingness-to-pay of each class member. Analytically, this would be the area between the demand curve in the actual world and the demand curve in the But-For World. However, this is not how I estimate class-wide damages. In my approach, only the willingness-to-pay of the marginal consumer who determines the market equilibrium in the actual world enters the economic loss calculation.

3.2   An Application of the Economic Framework to False Advertising Cases

44.   I will now apply the economic framework explained above to an illustrative example related to false and misleading advertisements.

45.   Let us assume the following:

   a. XYZ, Inc. sells 1,000 units of Product A for $50 using a statement claiming that Product A has Attribute X.

   b. Attribute X is a desirable attribute.

c. Consumers view Product A with Attribute X as superior to an otherwise identical product without Attribute X.

d. The resulting market price for Product A with Attribute X will be higher than the market price for an identical product but without Attribute X, or in other words, the demand curve for the product without Attribute X is below the demand curve for the product with Attribute X.

e. XYZ, Inc. advertised its Product A as having the desirable attribute X without disclosing to the consumers that Product A does not have Attribute X.

f. At some point, XYZ, Inc. discloses that its Product A does not have and never has had the desirable Attribute X.

g. Subsequently, a consumer class action is filed alleging that XYZ, Inc. falsely claimed that Product A has Attribute X.

h.   The Plaintiffs in the class action lawsuit claim that they would not have paid $50 for Product A had they known at the point of purchase that the product does not have Attribute X as claimed by XYZ, Inc. Consequently, XYZ, Inc. increased its revenue and profits at the expense of the consumers who paid $50 for Product A thinking that it has Attribute X. At issue in the consumer class action are the 1,000 units of Product A that were sold before it was disclosed that Product A does not have Attribute X.

46.   In the following paragraphs, I will refer to the situation where 1,000 consumers bought Product A for $50 expecting that it has Attribute X as advertised as the "Actual-World." In contrast, I will refer to the situation where the consumers are informed at the point of purchase that Product A does not have Attribute X as the "But-For-World."

3.2.1   Modeling the "But-For-World"

47.   Following the above cited reasoning in the *Reference Guide on Estimation of Economic Damages*[22], the Actual-World is the world where XYZ, Inc. (now the Defendants in the class action lawsuit) concealed the fact that Product A does not have Attribute X, and where XYZ, Inc. sold 1,000 units at $50; while the But-For-World is the hypothetical world where the Defendants

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[22]   See Footnote 13.

would have disclosed the truth (i.e., Product A does not have Attribute X) to consumers at the point of purchase. The question now becomes at what price would have 1,000 units of Product A sold after the disclosure.

48.   If consumers view Product A without Attribute X as inferior to Product A with Attribute X, then their demand for Product A without Attribute X will shift downward, all else, resulting in lower volumes sold at any given price. If the market price for Product A without Attribute X is lower than $50 after the disclosure that Product A does not have Attribute X, then every consumer who bought Product A in the Actual-World with the belief that it has the desirable Attribute X at $50 will have overpaid, and thus suffered an economic loss.

49.   To determine the economic loss, one needs to estimate the demand curve in the hypothetical But-For-World. If the demand curve in the But-For-World shifts downward because Product A without Attribute X is less desirable then the shift of the demand curve would result in a lower market price and/or a lower transaction volume in the But-For World. In other words, Defendants' misrepresentation in the Actual-World about Product A having Attribute X, may have induced more consumers to purchase Product A at a higher price. Therefore, the relevant measure for the economic loss is the downward shift in demand in the But-For-World evaluated at the quantity sold in the Actual-World.

3.2.2   Consideration of the Supply Side in the But-For-World

50.   In the But-For-World, the consumers know at the point of purchase that Product A does not have Attribute X, which makes Product A less desirable to them. Consequently, they would pay a lower price for the product in the But-For-World. Consumers who bought in the Actual-World assuming that Product A does have Attribute X thus overpaid, and need to be compensated for the loss of utility they experienced from not getting Product A with Attribute X. This can only be achieved by determining the reduced price at which 1,000 consumers would have purchased in the But-For-World, and providing purchasers with a compensation that effectively shifts the But-For demand curve up into the market equilibrium of the Actual World.

51.   The shape of the supply curve(s) in the Actual-World and in the But-For-World is irrelevant for the quantification of economic damages because the focus is to determine a price in the But-For-World for the units sold in the Actual-World. In other words, the focus is on the same

volume point on the two demand curves. In both the Actual-World and the But-For-World, the Defendants will incur the same marginal costs for producing and selling Product A. Moreover, in the But-For-World, Product A will simply no longer be sold as having Attribute X, and therefore, the But-For-World is defined as differing from the Actual-World only by virtue of the disclosure that Product A does not have Attribute X.

52.   If the demand curve shifts downward in the But-For-World after disclosing that Product A does not have Attribute X, then all consumers who bought Product A in the Actual-World overpaid, and therefore, the 1,000 units of Product A sold in the Actual-World are pertinent to the computation of Class-wide damages.

3.2.3   Determination of Economic Loss

53.   To determine how much the demand curve would shift when it is revealed that Product A does not have Attribute X, the price paid in the Actual-World has to be compared to the price the consumers would have paid for Product A without Attribute X in the But-For-World.

54.   For example, if the price point for selling 1,000 units in the Actual-World is $50 and the price point for selling 1,000 units in the But-For-World is $30, then difference of $20 is the amount that will compensate each consumer for the amount they overpaid for a unit of Product A, as a result of Defendants concealing the fact that Product A does not have Attribute X.

55.   Each consumer who bought Product A with the understanding that it has Attribute X in the Actual-World has to be made whole because they overpaid for the product. Total damages for those consumers equal the per unit price difference of Product A sold in the Actual-World (Product A has Attribute X) and in the But-For-World (Product A does not have Attribute X) multiplied by the total number of units of Product A purchased by consumers in the Actual-World.

56.   The approach to estimating class-wide economic damages introduced in this Section appropriately focuses on the single class-wide compensation that would be required to clear the market if the misrepresentations had been disclosed to members of the putative class at the point of purchase.

57.   The class-wide economic loss is the product of this compensation and the number of units sold by Defendants in the Actual-World.

3.3 Consideration of Alternative Damage Theory That Allows the Manufacturer to Maximize Profits in the But-For World

58.   In Figure 2 we explore further the argument that the relevant but-for price should be on the supply curve by assuming constant cost per unit over the relevant range of output in the actual world, resulting in a horizontal supply curve. In this case, the equilibrium price in the but-for world at the intersection of supply and demand (Point C) is the same as in the actual world (Point A), resulting in zero economic loss per unit. However, fewer class members would have purchased at this price in the but-for world. Hence, this approach does not provide restitution for all class members. Restitution for all class members can only be achieved if the price premium is calculated as the difference between the actual and the but-for demand for the quantity sold in the actual world. This is the difference between the prices in Point A and Point B in Figure 1 and Figure 2.

Figure 2: Actual and But-for Demand & Supply In False Advertising Cases With Horizontal Supply
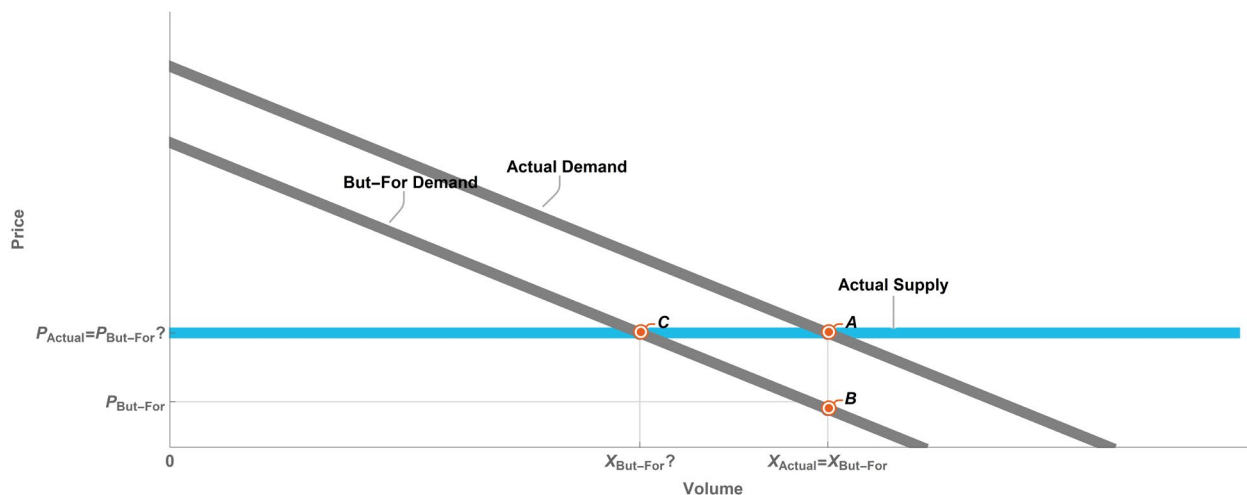
Source: Illustrative Example.

4   Conjoint Analysis

59.   In this Chapter, I describe Choice-Based Conjoint ("CBC") analysis with subsequent market simulations which is a reliable methodology to test empirically whether the disclosure that a particular statement is false and/or misleading leads to a downward shift of the demand curve.

CBC builds on the statistical methods of Hierarchical Bayesian Estimation ("HBE") and Mixed Logit Models ("MLM") to quantify consumer preferences and to calculate choice probabilities for the Product bundles included in the CBC study.

4.1   Introduction

60.   It appears to be a simple task to ask class members directly, how much they would have paid for the Products at Issue had they known at the point and time of purchase that the packaging contained misrepresentations and omissions. However, class members – in particular if they know that they are part of the class – are likely to respond strategically and to overstate the loss they have incurred by the misrepresentations and omissions. In order to avoid or reduce strategic responses, researchers designed conjoint analysis that hide the true purpose of the research from the subjects of the research.

4.2   Overview of Conjoint Analysis

61.   The general idea behind conjoint analysis is that consumers' preferences for a particular Product are driven by attributes, features or descriptions/advertisements of attributes/features embodied in that product.[23]

62.   CBC studies allow one to predict the share of respondents that would have chosen a specific product as described by the attribute levels.[24] Based on these estimations, it is possible to simulate ceteris paribus:

    a.   how a change in price changes the propensity to purchase, and

    b.   how demand changes if product attributes change.

    c.   CBC thus can determine the difference in value (measured in dollars or as a percentage of the purchase price in the Actual-World) that customers place on Products without misrepresentations and without omissions compared to an otherwise identical product with misrepresentations and with omissions.

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[23]   Lancaster, K. J. (1966). A New Approach to Consumer Theory. *Journal of political Economy, 74*(2), 132-157.

[24]   Allenby, G. & Rossi, P. (2006). *Hierarchical Bayes Models,‖ in the Handbook of Marketing Research: Uses, Misuses, and Future Advances, R. Grover, Ed., and M. Vriens, Ed*. Thousand Oaks: Sage Publications.

63.   Conjoint analysis is widely used in market research and is discussed in depth in the market research literature.[25] Bryan Orme, the founder of Sawtooth software for conjoint analysis, estimates that over 18,000 commercial applications of conjoint analysis take place each year.[26] For example, Vithala Rao's book, *Applied conjoint analysis*, and Bryan Orme's book, *Getting Started with Conjoint Analysis: Strategies for Pricing Research*, provide numerous examples of the widespread use of conjoint analysis including, but not limited to, several high-profile applications by large corporations and large public agencies such as (i) Microsoft for pricing newly released hardware products, (ii) Proctor & Gamble for consumer-goods pricing and new product development, (iii) Marriott Corporation for the development of the Courtyard hotel brand, (iv) AT&T for developing optimal cellular plans and (v) the development of the EZ-Pass electronic toll collection system by regional transit agencies in New York and New Jersey in the 1990s.[27]

64.   Using survey data, conjoint analysis is a set of econometric and statistical techniques that have been developed to study consumers' decision-making processes, determining trade-offs between products, features, and price, as well as quantifying consumers' gains and/or losses of utility when choosing between different alternatives. By simulating real world and/or hypothetical choices between product features and prices under different levels of information, conjoint analysis is ideally suited to model the impact of different choice scenarios on a consumer's utility function. Conjoint analysis has been accepted as a methodology sufficient to measure class-wide damages in other deceptive advertising cases and in product defect cases across the country.[28]

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[25]   See, for example, Rao, V. R. (2014). *Applied Conjoint Analysis*: Springer.,Orme, B. K. & Chrzan, K. (2017). *Becoming an Expert in Conjoint Analysis*: Sawtooth Software, Inc.

[26]   Orme, B. K. (2014). *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research* (3rd ed.). Manhattan Beach, CA: Research Publishers LLC, p. 143.

[27]   *Ibid*. pp. Foreword, Chapters 4.2, 14.11, and 14.18.

[28]   See e.g., *In Re Arris Cable Modem Consumer Litigation*, No. 5:17-CV-01834-LHK, 2018 U.S. Dist. LEXIS 136617 (N.D. Cal. Aug. 10, 2018); *Khoday v. Symantec Corp*., 93 F. Supp. 3d 1067, 1082 (D. Minn. 2015). *See also TV Interactive Data Corp. v. Sony Corp*., 929 F. Supp. 2d 1006, 1026 (N.D. Cal. 2013); *Sanchez-Knutson v. Ford Motor Company*, 181 F. Supp. 3d 988, 995 (S.D. Fla. 2016); *Dzielak v. Whirlpool*, 2017 WL 6513347 (D.N.J. Dec. 20, 2017); *In re ConAgra Foods, Inc*., 90 F. Supp. 3d 919 (C.D. Cal. 2015); *In Re Dial Complete Marketing and Sales Practice Litig*., 320 F.R.D. 326 (D.N.H. 2017); *Fitzhenry-Russell v. Dr. Pepper Snapple Group, Inc.*, No. 5:17-cv-00564, (N.D. Cal., June 26, 2018); *Theodore Broomfield, et al. v. Craft Brew Alliance, Inc*., No. 5:17-cv-01027-BLF (N.D. Cal., Sept. 25, 2018); *Hasemann v. Gerber Products Co*., No. 15-cv-2995MKBRER (E.D.N.Y. Mar. 31, 2019).

65.   The data required for a conjoint analysis is collected through a survey where study participants are shown several product profiles with different levels of each attribute. The survey participants are generally consumers who currently are, or recently have been, in the market for the product of interest. After reviewing a set of choice menus of product attributes and their levels, survey participants are then asked to indicate their preferences for those profiles. The product profiles include choice options for different price points for each set of features on the choice menu.

66.   After the completion of the CBC study, conjoint analysis uses data from the survey on the attribute levels of the product profiles shown and the stated preferences for one choice set over another to decompose the respondents' preferences for the product into the partial contribution of these attribute levels or part-worths to the overall product utility using appropriate statistical methods, more specifically Hierarchical Bayesian Estimation and Mixed Logit models. These advanced statistical techniques will be discussed in more detail in Section 4.3 below. These statistical estimation techniques quantify the part-worths for attribute levels such that the resulting estimated part-worths best predict respondents' preferences or choices as a whole based on their CBC study responses. By summing the respondents' part-worths for different attribute levels, one can determine the share of respondents that would have purchased the product made up of the different levels of each attribute at a given price. By varying the price, we can estimate a demand curve for a specific product.

67.   The price reduction needed to compensate for the loss of a feature (or the incremental price consumers would pay for the inclusion of a feature) can then be estimated, and a variety of choice situations and trade-offs between choices can be modeled, along with a precise quantification of their outcomes. The precision, and thus the reliability, of the resulting estimations depends on the number of survey participants. The more respondents that take part in the survey, the more precise the resulting predictions will be. However, adding more respondents to a survey is costly and the marginal benefit of adding respondents to a survey is declining. In Section 5.1.2, I describe a rule of thumb on how many respondents to include in a conjoint survey.

4.3   Statistical Estimation Techniques Utilized in CBC Studies

68.   After the completion of the survey, the conjoint analysis uses data from the survey to decompose the respondents' preferences for a product into the part-worths of its attribute levels using appropriate statistical methods. The statistical models to be used in my analysis, Mixed Logit Models and Hierarchical Bayesian Estimation ("HBE"), are widely employed in economics and marketing research to analyze preferences over a discrete set of choices.[29] These statistical estimation techniques quantify the part-worths for feature levels such that the resulting estimated part-worths best predict respondents' preferences or choices from the survey. By adding up the part-worths by each respondent at the different attribute levels, one can determine the share of respondents that would have purchased the product made up of the different levels of each attribute and a given price.

69.   Mixed Logit models are based on the idea that each consumer assigns a utility to each choice, and this utility measures the attractiveness of each choice. These utility values are correlated with the attributes of the actual choice (e.g., products with a misleading claim) and the price associated with that choice. The utilities can be correlated with observable characteristics of the consumers making the choice (such as their age or income).

70.   The utility of each product consists of two components – a deterministic component and a random component. The deterministic component can be modeled by observable factors such as socio-economic and demographic characteristics of the consumers, product features, and market conditions. In general terms, the random component, by contrast, summarizes all the unobservable factors in the individual consumer's choice process. In Mixed Logit models, the random component is expressed through a logistic distribution function. Together with the observable factors, this distribution function is used to predict the probability that a particular consumer choice is made.[30]

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[29]   *See,* for a detailed discussion, Orme, B. K. & Chrzan, K. (2017). *Becoming an Expert in Conjoint Analysis*: Sawtooth Software, Inc., Chapter 10.

[30]   *See*, for example: Rao, V. R. (2014). *Applied Conjoint Analysis*: Springer., Chapter 4, for a detailed discussion of the use of mixed multinomial logit models in choice based conjoint studies.

71.   Bayesian statistics is a field of statistics where the underlying model parameters are assumed to be random variables rather than fixed quantities. Bayesian modelling is based on assigning prior probability distributions to any unknown parameters. In this case, the unknown parameters to be estimated are the part-worths of the attributes of a composite product derived from the choice sets in the conjoint analysis. These parameters are estimated by a technique referred to in the literature as Hierarchical Bayesian Estimation ("HBE").[31]

72.   In HBE, the parameter estimates are derived in a two-step hierarchical approach. At the higher level, the individual consumers' part-worths are assumed to follow a specified distribution (like multivariate normal distribution or log-normal distribution). At the lower level, it is assumed that the individual consumers' choice probabilities can be described by a model, such as a Mixed Logit model. Initial estimates of part-worths are estimated for each study respondent as a starting point. New estimates are updated using an iterative process called "Gibbs Sampling" and "Metropolis Hastings Algorithms."[32] This process is typically repeated thousands of times whereby at each iteration, an estimate is made for each parameter, conditional on current estimates of the others. After many iterations, this process converges to the correct estimate for each of the parameters.

73.   The HBE method combines random effect specifications at the aggregate level to account for variation across individuals and specific modelling of choice probabilities at the individual level. With market simulations, the performance of competing alternatives can be evaluated.

74.   The software program Sawtooth[33] is a commercially available and highly regarded software to compute part-worths for the attribute and its levels for each attribute in the study. The Sawtooth software applies the Hierarchical Bayesian Estimation technique explained above to compute individual part-worths for each respondent and aggregate part-worths for all levels and

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[31]   *See Ibid*. Chapter 4.11, for a detailed discussion of the use of Hierarchical Bayesian Estimation in choice based conjoint studies.

[32]   *Ibid*. p. 168.

[33]   Sawtooth software is a world leader in market research for conjoint analysis providing powerful tools for measuring how consumers value features of a product or service. For more information, see www.sawtoothsoftware.com/.

attributes in the study. The Sawtooth software allows the researcher to test different model specifications.

75.   The Sawtooth software allows the researcher to "smooth" the part-worth estimates in a way that higher price levels for a specific attribute combination are always associated with a lower part-worth value. This feature ensures that, not only are aggregated consumer choices used, but that individual consumer choices are also always associated with decreasing utility values for increasing prices. When using a monotonicity constraint, the demand curves are smoother, and therefore, the resulting market simulations have fewer extreme data points which makes them more robust.

76.   Furthermore, advanced statistical methods can be applied to compute model-based approximate confidence intervals for well-designed and well-balanced non-probability samples. In 2016, the American Association of Public Opinion Research ("AAPOR") issued a guidance paper on "Reporting Precision for Nonprobability Samples"[34] which details approaches and reporting guidelines for precision calculations performed for non-probability samples. For the statistical analysis of the data obtained through the CBC study, I will apply one of the recommended methods to obtain precision estimates and approximate confidence intervals at the customary 95% level for the results of the study. The bootstrapping methodology and the use of non-parametric percentile-based approaches have been endorsed as valid approaches by AAPOR.[35] Furthermore, the aforementioned Sawtooth Software also allows for a non-parametric approach in computing confidence intervals.

4.4   Measuring the Value of a Level of an Attribute Using CBC

77.   The following steps explain the mechanics of how the results of a CBC study can be used to determine the value of an attribute.

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[34]   AAPOR Guidance on Reporting Precision for Nonprobability Samples - https://www.aapor.org/getattachment/Education-Resources/For-Researchers/AAPOR_Guidance_Nonprob_Precision_042216.pdf.aspx

[35]   https://www.aapor.org/getattachment/Education-Resources/For-Researchers/AAPOR_Guidance_Nonprob_Precision_042216.pdf.aspx.

78.   Based on the part-worths derived from the CBC study, I can calculate the share of study participants who would have purchased a certain product with one of the possible attribute level combinations at a given price.

79.   In the example presented in Figure 3 below, 45% of study participants would buy Product A without the desirable Attribute X for $30.00.

80.   If I now add the desirable Attribute X to Product A, all else equal and without changing the price, I move up vertically and 80% of study participants would buy Product A.

81.   All else equal, if the price for Product A with Attribute X was increased to $50, the percentage of study participants choosing Product A with the desirable Attribute X drops to 45%, which was the same percentage of study participants who bought the Product A without the desirable Attribute X for $30.00.

82.   Any further increase in price would make fewer study participants choose Product A with the desirable Attribute X. In an economic sense, the CBC study has shown that consumers are indifferent between buying Product A without the desirable Attribute X at $30.00 and buying the otherwise identical product with the desirable Attribute X at $50.00. This implies that the value of the desirable Attribute X to consumers is $20.00 ($50.00 minus $30.00).

Figure 3: Measuring the Value of a Level of an Attribute Using CBC Analysis
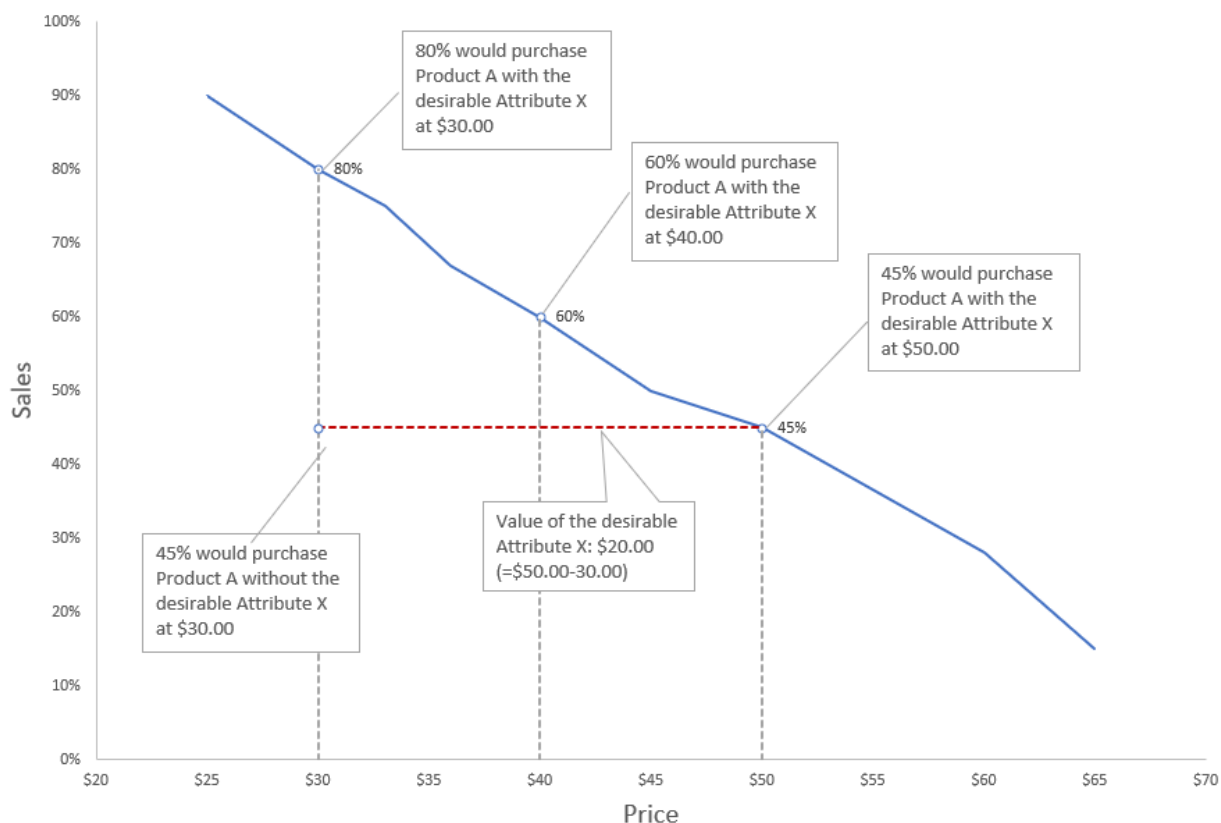
Source: *Illustrative Example*

83.   The calculation described above essentially finds the intersection between

  a. The curve representing the decreasing share of respondents who would have purchased Product A with the desirable Attribute X, and

  b. The horizontal (dotted red) line representing the share of respondents who would have bought the otherwise identical Product A without the desirable Attribute X.

84.   In more general terms, using the results from the CBC study, the value of each attribute can be determined as follows:

  a. Find the share of study participants S_{wo} who would pay Price P_1 for a product without the attribute.

b. Add the attribute and calculate the share of study participants S_w who would buy the Product at price P_1.

c. Incrementally increase the price until you find the price P_2 for which the share of respondents buying the product with the attribute (S_w) equals the share of study participants buying the product without the attribute (S_{wo}).

d. The difference P_2 minus P_1 provides a reliable estimate of the value of the attribute.

4.5   Constructing Demand Curves

85.   By using the individual part-worths, it is possible to estimate the share of respondents who would purchase a specific combination of attribute levels used in the conjoint survey. By varying the price levels while keeping all other attributes constant, we can determine the demand curve for any specific combination of product attributes and their levels as part of a market simulation.

86.   I estimate a regression function in which the price is a function of the attribute levels and the share of respondents who would have purchased this particular attribute level combination.

87.   By changing the level of one attribute, for example for the attribute level "may contain measurable amount of Heavy Metals" and "does not contain Heavy Metals", while keeping all other attributes constant, we can compute two demand curves:

a. the Actual-World demand curve for a product without a label that says the product may contain heavy metals, and

b. the But-For demand curve for the same product but with a label that says the product may contain heavy metals.

88.   If for a given volume the two demand curves result in different prices, one can then determine the compensation purchasers would require so that the number of products sold in the Actual World and the But-For-World remains unchanged.

89.   To assess the robustness of the demand curve estimation under a variety of market conditions, I performed a comprehensive market simulation study. In my market simulations, I used all variations of the attributes and levels defined in the conjoint study to test if economic damages exist.

90.   Market simulations[36] are necessary to convert the part-worths from the conjoint study into reliable monetary measures reflecting consumer preferences and choices. These monetary measures will ultimately be utilized to test and quantify how changes in an attribute will affect the value that consumers put on that attribute. In general, different permutations of product attributes and levels of those product attributes are applied in a market simulation to assess the respondents' choice probabilities for different combinations of product attributes and the resulting economic loss. This approach allows to estimate the value of each attribute individually and in combination with other attributes in the conjoint study.

4.6   Market Estimates vs. Individual Economic Loss

91.   My model is designed to provide market-wide estimates of economic loss. Sawtooth estimates part-worths for each participant in the study. Therefore, it could be tempting to estimate economic loss at the individual level. As I discuss in the following, such analysis will provide unreasonable results and would not be reliable.

92.   It is well-established that individual level part-worth estimates of conjoint models are not reliable at the individual level and that results should only be considered at the aggregate level, as summarized by Brian Orme, one of the authors of the Sawtooth conjoint software which I rely on in my analysis[37]:

> *Since the late 1990s, hierarchical Bayes has permitted individual-level estimation of part-worth utilities from CBC data. But to compute individual-level models, HB uses information from many respondents to refine the utility estimates for each individual. Therefore, one usually does not calculate utilities [part-worths] using a sample size of one.*

93.   Or as Hauser & Rao (2004) explain[38]:

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[36]   Orme, B. K. & Chrzan, K. (2017). *Becoming an Expert in Conjoint Analysis*: Sawtooth Software, Inc., Chapter 10.

[37]   Orme, B. K. (2014). *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research* (3rd ed.). Manhattan Beach, CA: Research Publishers LLC, p. 68.

[38]   Hauser, J. R. & Rao, V. R. (2004). Conjoint Analysis, Related Modeling, and Applications. In *Marketing Research and Modeling: Progress and Prospects* (pp. 141-168): Springer, p. 18.

> *[...] while consumers are heterogeneous, there is information in the population distribution that can be used to constrain the estimates of the partworths for each respondent. [...] The researcher does not attempt to estimate point-values of the partworths, but endeavors to fully characterize the uncertainty about those estimates (mean and posterior distribution).*

94.   While these quotes make a strong argument not to rely on individual estimates, in the following, I illustrate further why individual estimates are not reliable.

95.   For example, one of my conjoint surveys explained in the later sections contains six attributes. Five attributes are binary and the sixth attribute, price, has five levels. Therefore, the survey includes 160 permutations[39] of the attributes. Based on my survey design, each respondent sees 15 screens with two choices on each. Hence, each respondent sees a total of 30 combinations of the six attributes in the conjoint survey. That means that each respondent sees only 18.8%[40] of all possible permutations. It would therefore be very difficult to predict whether a specific respondent would choose a particular attribute combination over another attribute combination that this respondent has not actually seen in her survey and for which we have not collected any data. In order to properly predict how a specific respondent would choose between two choice sets, we would need to have each respondent go through many more choice sets – a tiring exercise for each respondent and not necessary for the purpose of my research.

96.   We are interested in how the market overall would react to a change in the attributes of a product. We are not interested in the probability of each individual survey participant purchasing all possible attribute combinations.

97.   Estimating the share of respondents who would purchase a particular attribute combination does not require precise predictions for each individual respondent. By estimating a share at the aggregate level, we are able to provide an estimation that – in the aggregate – is reliable.

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[39] $160=2 \times 2 \times 2 \times 2 \times 2 \times 5$.

[40] $18.8\% = 30/160$.

98.   This approach is analogous to the use of statistical sampling to predict consumer behavior in general. No sampling-based model designed to predict consumer behavior would make predictions based on a sample size of one consumer because such a model would fail to predict market-wide consumer behavior and preferences.

5   Design and Implementation of CBC Study for Economic Loss Calculations

99.   In this chapter I discuss the design and implementation of my CBC study. I describe technical design details, criteria for choosing attributes, the implementation of the CBC study and the pre-test I conducted to ensure the survey provided reliable results.

5.1   Technical Design Details

100.   In this Section, I discuss the technical design details that I implemented to make my CBC for economic loss calculations reliable.

5.1.1   CBC Study Design

101.   The CBC methodology employed in the conjoint survey randomly assigns choices from all possible choice permutations with equal likelihood and with uniform frequency of each level of each attribute and each pair of attribute/level permutations. That is, the CBC design is *balanced* and *orthogonal*. Balanced and orthogonal surveys are commonly employed in CBC.[41] The importance of an orthogonal and balanced design lies in the fact that designs of this type are 100% efficient. Efficiency implies that the resulting estimations have the smallest mean squared error out of all possible designs.[42] The mean squared error measures the level of variation and, as such, the precision of the resulting estimates. The smaller the mean squared error of an estimate the more precise it is. As such, efficiency of a design is a measure of the information obtained from a design. Therefore, more efficient designs imply more reliable results.[43]

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[41]   Bakken, D. & Frazier, C. L. (2006). Conjoint Analysis: Understanding Consumer Decision Making. In *The Handbook of Marketing Research* (pp. 607-670). Thousand Oaks: Sage Publications, Inc. Chapter 15.

[42]   The mean squared error (MSE) is calculated as the average of the squared distances between the estimator and what is estimated, or the "errors." Efficient designs are ones that minimize the MSE.

[43]   The standard error is the standard deviation of the sampling distribution of a statistic. A smaller standard error implies a smaller margin of error, which results in a tighter confidence interval around an estimate.

102.   Based on a review of relevant materials, including but not limited to product packaging and sales data, I designed and performed a total of two conjoint surveys:

    a.   Acana Misrepresentation Survey;

    b.   Acana Omission Survey.

103.   In Section 2.2, I showed the results of my analysis of the Products' sales during the analysis period (see Table 2). Based on this analysis, I chose one Acana-brand Product with the highest revenue and/or the named plaintiff purchased as the products for my misrepresentations survey: Acana Regionals Meadowland with Free-Run Poultry, Freshwater Fish, and Nest-Laid Eggs Dry Dog Food 25lb ("Acana study product", see Table 2). To demonstrate that economic loss can be estimated for different package sizes, I chose 25lb as this size generated most revenue.

5.1.2   Sample Size

104.   Orme[44] recommends that the survey sample size should be computed according to the following formula:

$$\frac{nta}{c} \geq 1,000$$

105.   Where n is the number of respondents, t is the number of choice sets (15), a is the number of alternatives per set (2) and c is the maximum number of levels in any attribute (5). Entering the chosen values for each variable shows that n should be greater than 167:

$$\frac{n*15*2}{5} \geq 1,000 \text{ or } n \geq \frac{1,000*5}{15*2} = 166.67$$

106.   In each of my surveys, I decided to include 167 respondents from New York and between 398 and 417 participants from the remainder of the United States, well exceeding the minimum number of respondents that Orme[45] recommends. In total, my four surveys included 2,375 respondents (Table 11).

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[44]   Orme, B. K. & Chrzan, K. (2017). *Becoming an Expert in Conjoint Analysis*: Sawtooth Software, Inc, p. 96.

[45]   *Ibid*.

5.1.3   Target Population

107.   I understand that the Class in this case will be defined as all persons who reside in the State of New York who, from June 1, 2016 to the present, purchased Acana dog food products at issue in the State of New York for household or business use, and not resale.

108.   To select a sample that adequately represents the class members, survey respondents were only included in the survey if they met the following criteria:

   a.   Respondents are 18 years or older;

   b.   Respondents live in the United States;

   c.   Respondents or a close family member are not working in advertising agency or market research;

   d.   Respondents or a close family member are not working for a company that manufactures or sells dog food;

   e.   Respondents have had at least one dog in the past 3 years;

   f.   Respondents have purchased, or were involved in the purchasing decision, of dry dog food in the past 3 years;

   g.   Respondents have purchased dog food from at least one premium dog food brand in the past 3 years.[46]

5.2   Choosing Attributes for the CBC Study

109.   Choosing attributes and their respective levels is an important aspect of proper conjoint study design. In the following I describe the general consideration for attributes, the process of selecting attributes and the design of the choice menus that present the attributes.

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[46]   The list of competitor premium dog food was identified from a variety of sources: CPF1813214, slide 72; CPF1767531; and identified as "Competitors" in Expert Report of Dr. Robert H. Poppenga, DVM, PhD, DABVT, dated August 06, 2019, Scott Weaver v. Champion Petfoods USA Inc. and Champion Petfoods LP, United States District Court Eastern District of Wisconsin Milwaukee Division, Case No. 2:18-cv-1996-JPS.

5.2.1   General Considerations

110.   In conjoint analysis, an attribute is described as a characteristic or feature of a product, which is comprised of different levels. Each attribute must have at least two levels. An attribute with two levels is binary and may indicate whether a product has a certain characteristic or not. For example, in this case the product may be labeled to contain heavy metals or not.

111.   Most products have numerous attributes. Not all of the attributes of a product have to be shown in the conjoint menus. In practice, researchers often instruct survey respondents to assume that they are purchasing the product of interest with a specific set of attributes that does not vary, and then vary some of the many attributes that define a product typically focusing on important and relevant attributes. For example, even though having wheels is utterly important for driving a vehicle safely, researchers would typically not include the number of wheels in the conjoint analysis assessing demand for vehicles as all modern cars have four wheels, an attribute that does not vary between different makes or models.

112.   The academic literature recommends that CBC studies involve eight or fewer attributes, each comprised of two to five levels, in order to avoid fatigue and in order to consider the general ability of participants to process information.[47]

113.   V. R. Rao (2014) suggests two sources available for determining relevant attributes:[48]

    a.   Previous consumer surveys or market surveys;

    b.   A pilot survey in which respondents are asked to rank a large selection of attributes.

114.   Orme recommends not showing more than six attributes in a conjoint study.[49] Hence, besides the origin and price, which is required to determine the monetary value, I added other attributes as "decoys" to distract respondents from the real focus of the study. I selected the decoy attributes based on Defendants' packaging. These attributes are deemed to be relevant to consumers. That does not mean that these attributes need to be the most important attributes to

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[47]   Orme, B. K. (2014). *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research* (3rd ed.). Manhattan Beach, CA: Research Publishers LLC, p. 53.

[48]   Rao, V. R. (2014). *Applied Conjoint Analysis*: Springer, p. 43.

[49]   Orme, B. (2002). Formulating Attributes and Levels in Conjoint Analysis. *Sawtooth Software Research Paper Series*, p. 1.

consumers. Nor does it mean that the attributes currently need to be part of currently available products. Researchers regularly conduct conjoint surveys to assess how consumers value attributes manufacturers might consider adding to their products in the future.

5.2.2   Choice of Attributes for the Specific Study

115.   The goal of my studies is to assess the value that customers who purchase the Products would place on misrepresentations and omissions.

5.2.2.1   Misrepresentation Surveys

116.   The misrepresentations to be tested are as follows:[50]

   a.   Biologically Appropriate;

   b.   Fresh Regional Ingredients;

   c.   Delivering Nutrients Naturally.

117.   I included these three misrepresentations as attributes and/or levels. The "Fresh and Regional" attribute was broken up into three levels to test the impact of each individual claim and the combination of the two ("Fresh and Regional", "Fresh", and "Regional"). In order to prevent survey participants from focusing only on the attributes of interest[51], I included two additional decoy attributes that are not of interest, after reviewing the package of the Acana study product.[52] I chose "WholePrey Diet", "High Palatability" as they were also promoted and advertised on the actual package along with the misrepresentations subject to this litigation.

118.   Price is an important attribute of conjoint surveys and required to estimate the demand curves for my study. Conjoint analysis imitates the real-world purchase situation and the price levels presented to the respondents in the survey should cover an appropriate range of actual retail market prices. These prices reflect a market equilibrium of supply and demand in the Actual World. Three considerations determined the price range included in the study:

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[50]   Complaint, ¶12.

[51]   Researchers often refer to this as focalism bias.

[52]   25LBAcanaMeadowland_2015.pdf.

a. First, generally, the price range should cover realistic prices for the product. For example, a price of $0.25 for a 25-lb of dog food would not be realistic as the typical retail price of dog food is far higher. Similarly, a price of $200 would also not be realistic for the same size bag of dog food. From 2016 through 2018, in New York, the MSRP of Acana Meadowlands 25lb ranged from $65.99 to $68.99.[53]   As of February 2021, Acana Meadowlands in a 25-lb bag retails for $73.99 on Chewy.com.[54]

b. Second, prices can and need to be higher or lower than the prices of currently offered products as we test product attribute combinations that might not yet be available in the market.

c. Third, in the case where the impact of false and misleading advertising has to be assessed, the price for a product where it is known that the advertised claim is false and/or misleading has to be determined. However, such product is currently not available in the market. Hence, in order to estimate a demand curve for the product where it is known that the advertised claim is false and/or misleading, prices both below and above the price points common in the market have to be included.

119.   Because Defendants' products are being sold in different bag sizes, I used the most common bag size of 25-pounds in my survey. I chose five price levels between $46.99 and $87.99 as representative prices for a 25-pound bag. Those are not meant to be the exact prices charged for the products in the market but are reflective of the real-world price range as evidenced in Defendants' documents.[55] In my opinion, the chosen price range complies with the considerations for choosing product prices in CBC studies.

120.   Table 4 below shows all attributes and their levels of the Acana misrepresentation survey.

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[53]   CPF2117046.

[54]   https://www.chewy.com/acana-meadowland-grain-free-dry-dog/dp/123873, last accessed on February 18, 2021.

[55]   See CPF2117046-8 for a list of Defendants' suggested retail prices (MSRP) for Acana products in New York for 2016-2018.

Table 4: Acana Misrepresentation Survey - Attributes and Levels

	Attribute	Levels
1	Biologically Appropriate	1. Label Included (Biologically Appropriate) 2. No Label Included
2	WholePrey Diet	1. Label Included (WholePrey Diet) 2. No Label Included
3	High Palatability	1. Label Included (High Palatability) 2. No Label Included
4	Ingredient Sourcing	1. Fresh Regional Ingredients 2. Fresh Ingredients 3. Regional Ingredients 4. No Label Included
5	Delivering Nutrients Naturally	1. Label Included (Delivering Nutrients Naturally) 2. No Label Included
6	Price per 25-pound bag	1. $46.99 2. $57.99 3. $66.99 4. $73.99 5. $87.99

5.2.2.2   Omission Surveys

121.   The omissions to be tested are as follows:[56]

    a.   Heavy metals (Lead, Arsenic, Mercury, Cadmium);

    b.   Bisphenol A (BPA);

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[56]   Complaint, ¶¶5-7.

     c.   Regrinds;

     d.   Expired ingredients.

122.   I included the four omissions as attributes and levels so that I can assess the value that consumers would place on those. I also included an additional attribute that is not of interest, use of artificial preservatives, as a distractor attribute which prevents survey participants from focusing only on the attributes of interest.

123.   I chose five price levels between $46.99 and $87.99 as representative prices for a 25-pound bag of Acana omissions study product. Those are not meant to be the exact prices charged for the products in the market but are reflective of the real-world price range.[57] In my opinion, the chosen price range complies with the considerations for choosing product prices in CBC studies.[58]

124.   All attributes of the Acana omission survey, including the price attribute, and their levels are shown in Table 5 below. The descriptions for the attributes were provided by Plaintiffs' counsel.

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[57]   See CPF2117046-8 for a list of Defendants' suggested retail prices (MSRP) for Acana products in New York for 2016-2018.

[58]   See ¶123 for the considerations.

Table 5: Acana Omission Survey - Attributes and Levels

	Attribute	Levels
1	Artificial Preservatives	1. May contain artificial preservatives. Artificial preservatives are added to food to fight spoilage caused by bacteria, molds, fungus, and yeast. 2. [No Label Included]
2	Expired Ingredients	1. May contain expired ingredients. Expired ingredients are ingredients that have passed their "shelf life" date. 2. [No Label Included]
3	Heavy metals	1. May contain measurable amounts of heavy metals such as lead, arsenic, mercury, and/or cadmium. 2. [No Label Included]
4	BPA	1. May contain measurable amounts of BPA. BPA is a chemical compound used in plastic. 2. [No Label Included]
5	Regrinds	1. May contain regrinds. Regrinds are previously made dry dog food that is ground and then used in another batch of dry dog food. 2. [No Label Included]
6	Price	1. $46.99 2. $57.99 3. $66.99 4. $73.99 5. $87.99

Source: BRG conjoint study.

5.2.3   Design of Choice Menus

125.   Each study participant was given 15 CBC exercises. Each choice exercise consisted of two choices with various combinations of attribute levels and prices. As part of the introduction to the conjoint module, participants were introduced to each attribute. In addition, they could also

recall the information provided on each attribute in each conjoint exercise by hovering their mouse over a help icon.

126.   In each of the 15 exercises, respondents were presented with two choices out of 320 or 160 permutations.[59] Hence, each respondent saw a total of 30 permutations. After respondents choose their preferred option, they answer, "would you purchase the option you selected above?" This design is called the "dual-response none method"[60] and provides additional information because it is possible that the respondent would not want to buy any of the two options but prefers Option 1 over Option 2.

127.   In his seminal publication on conjoint analysis, Rao discusses the number of choices represented on one choice menu.[61] Recent eye-tracking studies have shown how respondents react to conjoint screens. The authors realized the value of limiting the number of options shown on each screen to two rather than three or five as had been often done in the past.[62] Following the academic research, I designed the study with two choice options per screen to enable respondents to process the complete information provided and to avoid issues of fatigue.

128.   It is a known phenomenon that choices presented earlier in a list of choices in a questionnaire are disproportionately likely to be selected.[63] This phenomenon is known as order bias. To avoid order bias in my study, each respondent saw the attributes in a randomly assigned order– except for price, which is always shown last. The reason for showing price last lies in the fact that the respondents must see the attributes of the product first to be able to decide for or against the purchase of an option. Also, per standard practice, while the order of attributes varied

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[59]   For the misrepresentation surveys, four attributes with two levels, one attribute with one level, one attribute (price) with five level yields 320 (=2x2x2x4x2x5). For the omission surveys, five attributes with two levels and one attribute (price) with five level yields 160 (=2x2x2x2x2x5).

[60]   Orme, B. K. & Chrzan, K. (2017). *Becoming an Expert in Conjoint Analysis*: Sawtooth Software, Inc, pp. 123-124.

[61]   Rao, V. R. (2014). *Applied Conjoint Analysis*: Springer, pp. 132-133.

[62]   Meyerding, S. G. (2018). Combining Eye-Tracking and Choice-Based Conjoint Analysis in a Bottom-up Experiment. *Journal of Neuroscience, Psychology, and Economics, 11*(1), 28., Bansak, K., Hainmueller, J., Hopkins, D. J. & Yamamoto, T. (2019). Beyond the Breaking Point? Survey Satisficing in Conjoint Experiments. *Political Science Research and Methods*, 1-19.

[63]   Krosnick, J. A. & Alwin, D. F. (1987). An Evaluation of a Cognitive Theory of Response-Order Effects in Survey Measurement. *Public Opinion Quarterly, 51*(2), 201-219.

between respondents, the order of attributes a specific respondent would see throughout his exercises did not vary.

129.   For the Acana misrepresentation survey, respondents were introduced to the same hypothetical purchase situation, but were asked to assume that they are purchasing a bag of the Acana study product[64]:

> *"Next, we have a brief exercise to help us learn about your dog food purchase preferences. Assume that you are purchasing a 25-pound bag of Acana Regionals Meadowland dry dog food.*
>
> *On the next 15 screens you will see different combinations of dog food labels that may be present on the bag at various price points. On each screen, please select the option that matches your preference. Assume that the dog food varies only on the features presented on the choice screen.*
>
> *There are no right or wrong answers. We are simply interested in your opinion. We hope you find this exercise interesting."*

130.   In the introduction screen, respondents were shown the front and back images of the Acana study product. The actual package images without any modification were used. Respondents had to confirm that they had reviewed the dog food images to proceed to the next step.

131.   Figure 4 shows examples of actual Acana packaging.[65] I adapted the general design, including font type and size, as well as background color in designing the attributes for the Acana misrepresentation survey. Table 6 shows the attribute description that respondents reviewed on the following screen. Respondents had to confirm again that they had reviewed the attribute descriptions to proceed to the next step.

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[64]   Screenshots of the surveys are included as Appendix 1.

[65]   CPFB00042.

Figure 4: Descriptions on the Acana Study Product's Packaging

Source: Bates CPFB00042.

Table 6: Acana Misrepresentation Survey - Attribute Descriptions

Attribute	Description
Biologically Appropriate	

Attribute	Description
WholePrey Diet	**WHOLEPREY™ DIET** POULTRY | ORGANS | CARTILAGE IN HER ETERNAL WISDOM, MOTHER NATURE MATCHED THE NUTRIENTS FOUND IN WHOLE PREY ANIMALS TO PERFECTLY MEET THE NEEDS OF YOUR DOG.
High Palatability	**HIGH PALATABILITY** INFUSED WITH FREEZE-DRIED CHICKEN LIVER

Attribute	Description
Ingredient Sourcing	FRESH INGREDIENTS We focus on fresh ingredients. REGIONAL INGREDIENTS We focus on ingredients from our region. FRESH REGIONAL INGREDIENTS We focus on fresh ingredients from our region that are ranched, farmed or fished by people we know and trust.
Delivering Nutrients Naturally	DELIVERING NUTRIENTS NATURALLY
Price	Price per 25-pound bag

Source: Screenshot of BRG survey fielded by Amplitude Research

132.   Figure 5 below shows an example of a choice menu for the Acana misrepresentation survey which incorporates the recommendations of proper choice menus design as discussed in this section.

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Figure 5: Acana Misrepresentation Survey - Example of a CBC Choice Menu

Please indicate which of the given options you would select. Hover your mouse over the (i) icon to see more information for each attribute. If a cell is BLANK, then no labels regarding the attribute are found on the dog food bag.

	Option 1	Option 2
WholePrey Diet (i)	WHOLEPREY DIET	WHOLEPREY DIET
Biologically Appropriate (i)	BIOLOGICALLY APPROPRIATE	BIOLOGICALLY APPROPRIATE
Delivering Nutrients Naturally (i)	DELIVERING NUTRIENTS NATURALLY	
Ingredient Sourcing (i)	FRESH INGREDIENTS	REGIONAL INGREDIENTS
High Palatability (i)		
Price (i)	$57.99	$46.99
Which option would you prefer?	○	○

Source: *Screenshot of BRG survey fielded by Amplitude Research*

133.   For the Acana omission survey, respondents were introduced to a hypothetical purchase situation where they are told to assume that they are purchasing a bag of their favorite dog food. The purchase situation and characteristics of the dog food given to respondents was as follows[66]:

> *"Next, we have a brief exercise to help us learn about your dog food purchase preferences. Assume that you are purchasing a 25-pound bag of your favorite dry dog food.*
>
> *The exercise has 15 screens with different combinations of dog food labels and prices. Assume that the dog food varies only on the features presented on the choice screen. Please select the option that matches your preference.*
>
> *There are no right or wrong answers. We are simply interested in your opinion. We hope you find this exercise interesting."*

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[66]   Screenshots of the surveys are included as Appendix 1.

134.   For the two surveys testing omissions, no packaging image was presented to the participants because, by definition, omissions are not present on any current packages of either brand. I would not be able to anticipate how Defendant would display if required, the contested omissions. Hence, I did not try to emulate Defendant's design and provided respondents with a text-based description of the Omissions.

135.   In the following screen of the conjoint survey, respondents were shown attribute descriptions (Table 7). Respondents had to confirm that they have reviewed the attribute descriptions to proceed to the next step.

Table 7: Acana Omission Survey - Attribute Description

Attribute	Description
Artificial Preservatives	May contain artificial preservatives. Artificial preservatives are added to food to fight spoilage caused by bacteria, molds, fungus, and yeast.
Expired Ingredients	May contain expired ingredients. Expired ingredients are ingredients that have passed their "shelf life" date.
Heavy metals	May contain measurable amounts of heavy metals such as lead, arsenic, mercury, and/or cadmium.
BPA	May contain measurable amounts of BPA. BPA is a chemical compound used in plastic.
Regrinds	May contain regrinds. Regrinds are previously made dry dog food that is ground and then used in another batch of dry dog food.
Price	Price per 25-pound bag

Source: BRG conjoint study.

136.   Figure 6 below shows an example of a choice menu for the Acana Omission Survey which incorporates the recommendations of proper choice menus design as discussed in this section.

Figure 6: Acana Omission Survey - Example of a CBC Choice Menu

Please indicate which of the given options you would select if a 25-pound bag of your favorite dog food had the following labels. If a cell is BLANK, then no labels regarding the attribute are found on your favorite dog food.

Option 1	Option 2
May contain **expired ingredients**. Expired ingredients are ingredients that have passed their "shelf life" date.	
May contain measurable amounts of **heavy metals** such as lead, arsenic, mercury, and/or cadmium.	
May contain **regrinds**. Regrinds are previously made dry dog food that is ground and then used in another batch of dry dog food.	May contain **regrinds**. Regrinds are previously made dry dog food that is ground and then used in another batch of dry dog food.
	May contain **artificial preservatives**. Artificial preservatives are added to food to fight spoilage caused by bacteria, molds, fungus, and yeast.
May contain measurable amounts of **BPA**. BPA is a chemical compound used in plastic.	May contain measurable amounts of **BPA**. BPA is a chemical compound used in plastic.
$66.99	$57.99
○	○

Source: Screenshot of BRG survey fielded by Amplitude Research.

5.3   Implementing the CBC Study

In the following I describe how I implemented the CBC study as an Internet panel survey. I describe the advantages of internet panels and discuss the vendor I chose to implement the internet panel survey.

5.3.1   Internet Panel Surveys

137.   Current research suggests that internet surveys have great advantages over other traditional survey methods. For instance, studies have found that computer data collection yields higher concurrent validity, with less chance of participants framing answers to attempt to please the questioner, and less random measurement error when compared to mall intercept and

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telephone surveys.[67] Internet surveys also allow for broad geographic reach to areas where surveying via mall intercept or other face-to-face methods are not be feasible.[68] The efficacy of internet-based surveys is also due to large internet panels retained by specialized market research firms. These firms employ trained professionals who program, administer, and quality control the surveys to increase the quality of the results.

138.   Internet surveys have become a standard tool in the corporate world. According to the Global Research Business Network, internet surveys now account for more than a quarter of global market and social research revenues. In many of the world's top research markets, internet surveys are now the primary means of research.[69] Well-executed internet survey research is regularly accepted by courts.[70]

139.   The conjoint survey was administered via an online panel. The survey vendors implementing conjoint surveys followed accepted standards regarding:

    a. Survey panelist recruiting;

    b. Strategic partnerships with other market research firms;

    c. Use of advanced software and technology;

    d. Use of proprietary survey completion time tracker;

    e. High quality filtering system to track respondent information and respondent behavior to deliver the highest quality sample;

    f. Best practices of quality control - including removal of sign-ups who provide inconsistent demographic information;

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[67]   Yeager, D. S., Krosnick, J. A., Chang, L., Javitz, H. S., Levendusky, M. S., Simpser, A. & Wang, R. (2011). Comparing the Accuracy of Rdd Telephone Surveys and Internet Surveys Conducted with Probability and Non-Probability Samples. *Public Opinion Quarterly, 4*(1).

[68]   *See* Diamond, S. S. (2011). Reference Guide on Survey Research. In *Reference Manual on Scientific Evidence* (3rd ed.): Washington D.C.: National Academies Press., p. 406.

[69]   Rao, L. (2015). *The Next Frontier for Online Survey Companies: Law Firms*. Fortune. Retrieved from http://fortune.com/2015/09/16/online-survey-companies-law-firms/.

[70]   Isaacson, B., Hibbard, J. D. & Swain, S. D. (2008). Why Online Consumer Surveys Can Be a Smart Choice in Intellectual Property Cases. *IPL Newsl., 26*(3).

     g. Survey participation validation.

140.   As is standard survey practice for surveys used in litigation proceedings, the conjoint survey was conducted in a "double-blind" fashion,[71] that is, neither the vendor nor the respondents should be aware of the survey sponsor or the ultimate intention of the survey. Additionally, the data collection and initial tabulation was automated and concurrent with answering the online questionnaire.

141.   To ensure that the data generated by the survey are of the highest quality, additional quality control measures were implemented:

    a. The panel owner tracked which panel members responded to the survey. Each respondent was only allowed to respond to a given survey once. As is standard practice, the detailed information on the respondents was not shared with us;

    b. The survey also included control measures to evaluate the extent to which respondents were involved in completing the survey. These may include: a review of each respondent's survey completion time, review of text field responses, straight-line testing, and other filtering techniques that filter automated responses and result in superior data and higher quality feedback.

142.   In summary, properly designed and well-executed internet-based surveys have been used to draw valid statistical inferences about the target population, provide reliable results and maintain accepted advantages over other recruiting methodologies. I follow standard practice tested and developed in many litigation cases.

5.3.2 Vendor Selection

143.   I commissioned Amplitude Research ("Amplitude"), a specialized survey company, to conduct my study as an internet panel survey.

144.   Founded in 2002, Amplitude Research® is one of the leading mail, telephone and online survey companies serving clients throughout the United States, Canada, South America, and Asia. Clients include commercial, educational, and governmental organizations. Amplitude Research®

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[71] Diamond, S. S. (2011). Reference Guide on Survey Research. In *Reference Manual on Scientific Evidence* (3rd ed.): Washington D.C.: National Academies Press.

is a member of the American Marketing Association (AMA), Marketing Research Association (MRA), Interactive Marketing Research Organization (IMRO), and Marketing Research Association of South Florida, and adheres to the professional guidelines for survey companies applied by these organizations. Amplitude Research is also A+ Rated by the Better Business Bureau.[72]

145.   Amplitude programed and hosted the surveys of my design and provided me with the raw data to analyze the preferences and choices of consumers. Amplitude conducted the field work in September and October 2020.

5.4   Pre-Test

146.   The *Reference Guide on Survey Research*[73] recommends administering a "pre-test" survey, which is defined as administering the proposed survey to a small sample of the same target population before conducting the full-scale study. Properly conducted pre-tests can inform the researcher of potential flaws in the survey design or sources of potential misunderstanding of the meaning of questions, giving the researcher a chance to rephrase and change wording of the questionnaire to be clear and unambiguous.[74]

147.   As the first phase of the field work, I conducted a pre-test of the surveys with 155 respondents to confirm that participants understand the questions and can perform the exercises. The participants in the pre-test were selected based on the same criteria as participants for the main survey. The pre-test participants were presented with the questionnaires I had designed for the surveys. In addition, the survey vendor conducted detailed phone interviews with 40 participants regarding the understanding of the purchase scenario described and the conjoint exercises. The results of this pre-test indicated that participants neither had problems understanding the questions in the survey nor understanding the purchases options presented in the choice menus.[75] I also reviewed the part-worths computed based on around 50-80 pre-test

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[72]   http://www.amplituderesearch.com/survey-company.shtml.

[73]   Diamond, S. S. (2011). Reference Guide on Survey Research. In *Reference Manual on Scientific Evidence* (3rd ed.): Washington D.C.: National Academies Press.

[74]   *Ibid.* pp. 388-389.

[75]   For details on the pre-test phone interviews, see Appendix 2.

responses for each study and conducted a number of diagnostic tests on the raw conjoint responses. I did not identify any issue that would indicate that respondents had not understood the survey. Hence there was no need to change the survey design and I rolled out the survey to a total of 2,375 participants. As is standard practice in cases when no survey design changes are needed, the responses of the pre-test group were included in the survey.

6   Empirical Conjoint Study Results

148.   In this section, I describe the results of the empirical study. I start with an overview before summarizing the results of the study.

6.1   Overview

149.   A total of 1127 panel members participated in the two conjoint surveys. In the following, I first present a descriptive analysis of the participants' demographics. I then discuss the results of the representativeness tests before presenting the economic loss estimates derived from my conjoint survey.

6.2   Demographics

150.   Respondents provided information on demographics and socio-economic variables, such as their age, gender, household income, and educational background. Table 8 shows the demographic distribution of respondents across all surveys. Appendix 3 provides the demographics of each survey in more detail.

151.   Slightly more women (54.9%) than men participated in the survey. This may reflect that more women than men purchase food for the household. The demographics of survey participants indicate that older, better educated, and more affluent households are the main consumer segments purchasing premium dog foods. 13.9% of respondents had purchased Champion dog food and 29.6% of respondents reside in New York.

152.   98.9% of respondents had a clear understanding of the survey. The few respondents who indicated that they did not have a clear understanding of the survey questions had to respond to a follow-up question that asked respondents to describe what they did not understand. Some of the comments of the few confused respondents indicated that these respondents were not familiar

with the concept of conjoint analysis. Not being familiar with conjoint analysis does not invalidate a participant's responses. I therefore included these responses in my further analysis.

Table 8: Survey Demographics

Category	Label	Misrepresentation		Omission		Total	
		Count	Share	Count	Share	Count	Share
Gender	Male	256	45.1	275	49.2	531	47.1
	Female	312	54.9	284	50.8	596	52.9
Age	18 - 29	57	10	60	10.7	117	10.4
	30 - 44	160	28.2	188	33.6	348	30.9
	45 - 59	80	14.1	161	28.8	241	21.4
	60 or higher	271	47.7	150	26.8	421	37.4
	Below 18						
Household Income	Less than $25,000	84	14.8	59	10.6	143	12.7
	$25,000 to $34,999	72	12.7	61	10.9	133	11.8
	$35,000 to $49,999	60	10.6	62	11.1	122	10.8
	$50,000 to $74,999	100	17.6	90	16.1	190	16.9
	$75,000 to $99,999	75	13.2	73	13.1	148	13.1
	$100,000 to $149,999	83	14.6	108	19.3	191	16.9
	$150,000 or more	67	11.8	88	15.7	155	13.8
	Prefer not to answer	27	4.8	18	3.2	45	4
Education	Less than high school	7	1.2	10	1.8	17	1.5
	High school	106	18.7	95	17	201	17.8
	Some college	176	31	176	31.5	352	31.2
	Bachelor's degree or higher	279	49.1	278	49.7	557	49.4
Pet Information	1	327	57.6	301	53.8	628	55.7
	2	152	26.8	174	31.1	326	28.9
	3	62	10.9	52	9.3	114	10.1
	4 or more	27	4.8	32	5.7	59	5.2
	None						
Clear Understanding	Yes	562	98.9	553	98.9	1115	98.9
	No	6	1.1	6	1.1	12	1.1
Awareness of Lawsuit	I am aware of at least one lawsuit	84	14.8	123	22	207	18.4
	I am not aware of any lawsuits	383	67.4	342	61.2	725	64.3
	Don't know / Unsure	101	17.8	94	16.8	195	17.3
Champion & NY	Champion Purchasers	79	13.9	89	15.9	168	14.9
	New York Residents	168	29.6	167	29.9	335	29.7
	Champion Purchasers & NY Resident	37	6.5	38	6.8	75	6.7

Source: BRG analysis of conjoint study responses.

6.3   Survey Validation

153.   In this Section, I present the results of a survey I conducted to assess what consumers expect when they see certain statements about positive attributes of a premium dog food product. In addition, I present two approaches to validating the conjoint survey results: First an importance score, which shows the relative importance of each attribute to the survey participants. Second, the Root Likelihood, which is a measure of the goodness of fit of the underlying econometric logit model.

6.3.1   Importance Score

154.   An importance score reflects the maximum effect each attribute has upon product choice. It is an intuitive measure that is easy to compute.[76] I quantified the relative importance of all attributes in the four surveys, including price, and also included a confidence interval for each metrics.[77] For the Acana misrepresentation survey, Price has the highest importance share (38.5%), followed by Fresh & Regional (14.9%) and Delivering Naturally (14.0%). In the Acana Omission survey, the attribute Price has a lower importance score than in the Acana Misrepresentation survey. This implies that the other attributes have a higher importance weight in the Omission surveys than the other attributes in the Misrepresentation surveys.

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[76]   Orme, B. K. (2014). *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research* (3rd ed.). Manhattan Beach, CA: Research Publishers LLC, p. 11.

[77]   Orme, B. K. & Chrzan, K. (2017). *Becoming an Expert in Conjoint Analysis*: Sawtooth Software, Inc, p. 183.

Table 9: Importance Score

Attribute	Acana Misrepresentation		
	Low	Median	Upper
Price	37.0	38.6	40.1
Delivering Nutrients Naturally	13.1	14.0	14.9
Fresh & Regional	13.7	15.0	16.2
Low Temperature/High Palatability	10.7	11.5	12.3
Whole Prey	8.9	9.8	10.7
Biologically Appropriate	10.3	11.1	12.0
	Acana Omissions		
Attribute	Low	Median	Upper
Price	17.5	19.3	21.1
Regrinds	5.2	6.5	7.7
BPA	18.9	20.2	21.4
Heavy Metals	33.1	34.6	36.1
Expired Ingredients	12.9	14.0	15.2
Artificial Preservatives	4.0	5.3	6.5

Source: BRG analysis based on Amplitude Survey.

6.3.2   Root Likelihood as Goodness of Fit Measure

155.   I utilized the root-likelihood ("RLH") measure [78] to assess if the overall prediction model is reliable. The root-likelihood measures how well the part-worths estimates fit the choices made by the participants. Using the underlying logit function, it is possible to predict the probability that respondents would make the choices they made. The root-likelihood is the geometric mean of the estimated choice probabilities for each participants' choices. The value of the RLH is directly associated with the number of options in each choice menu – if a study has 5 options then the null likelihood (the predictability of the responses using uninformative utilities) is $1/5 = 0.2$. Therefore, a fit of 0.2 or less in a five-alternative choice study would not be good.

156.   In this case, all survey choice menus have two options to choose one from. In addition, the survey choice menus included the no purchase options. Therefore, the null likelihood equals

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[78]   Orme, B. K. (2014). *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research* (3rd ed.). Manhattan Beach, CA: Research Publishers LLC, pp. 214-215.

1/3 = 0.33, which implies that RLH values would have to be larger than 0.33 to indicate a good model fit.

157.   Table 10 shows the RLH goodness of fit measure for the underlying logit model. A model that randomly chooses alternatives with equal probability has an RLH of 1/k, where k is the number of alternatives. A model with a good fit to the data should have a larger RLH than this. The average and median root likelihoods for Survey 3 are both 0.687 and 0.702 respectively, while the average and median root likelihoods for Survey 4 are 0.682 and 0.702, respectively.

158.   Between 99.8% and 100% of respondents have a RLH greater than 0.33. Hence, the logit model for all four surveys predicts the results for 99.8% of all respondents better than a model that chooses alternatives at random.

Table 10: RLH Metrics

Description	2.5%	Median	97.5%	Mean	>0.33	>0.33 in %
Acana Misrepresentation	39.0%	70.2%	93.9%	68.7%	568	100.0%
Acana Omissions	39.7%	70.2%	92.5%	68.2%	558	99.8%

Source: BRG analysis based on Amplitude Survey.

6.4   Market Simulation and Economic Loss Estimates

159.   I applied a market simulation to estimate the economic loss associated with purchasing Defendants' product when it is revealed at the time and place of purchase that there were misrepresentations and certain key information had been omitted from the product.

160.   Market simulations are an important tool to convert the part-worths from the conjoint study into monetary measures reflecting consumer preferences and choices. [79] In general, different permutations of product attributes and levels of those product attributes are applied in a market simulation to assess the respondents' choice probabilities for different combinations of product attributes and the resulting economic loss.

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[79]   *Ibid.* pp. 93-96.

161.   The market simulation consolidates the preferences and choices for all respondents which enables us to answer questions about preference and likelihood of choice when attributes and levels of product attributes are changed.

162.   In my market simulations[80], I have varied the levels of attributes and prices, resulting in a discrete number of possible combinations and the associated share of respondents who would have purchased that product based on the HBE calculations. A regression analysis isolates the contribution of each attribute level and the market share to the variable price. Based on this regression model I can calculate demand curves for any attribute combination by varying the market share while keeping all other inputs constant. In addition, I can draw two sets of demand curves where I vary one particular attribute of interest while keeping all other attributes constant.

163.   In Figure 7, the dark gray line is an example of the demand curve based on this regression model. The light gray line in Figure 8 shows the demand for the same product specification for the case that it is known at the time and point of purchase that the Product is not Fresh & Regional. The fact that the empirically derived demand curve has shifted downwards proves empirically that the product becomes less desirable when it is disclosed at the time and point of purchase that the product is not Fresh & Regional.

Figure 7: Example of actual and But-For Demand for a Acana Product With Disclosure that Product is Not Fresh & Regional

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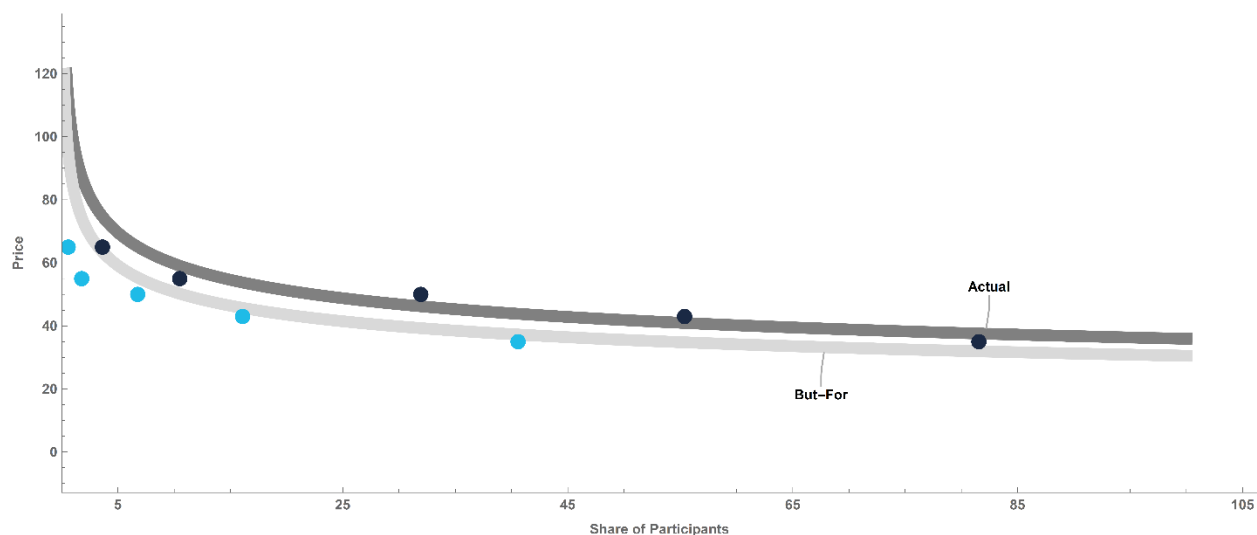
80   See Section 4.5 for a description of the methodology.

Source: BRG Calculations Based on CBC Study.

164. In the double-log model specification, the differences in percent between the demand curves in the Actual-World and the But-For-World are independent of the position on the demand curve.

165. Following Orme's approach to confidence intervals[81], I estimate confidence intervals by estimating the same regression as described above for 1,000 average partworths based on all respondents and 10 consecutive draws. From the 1,000 values for each coefficient, I then compute the 95% confidence interval by sorting these values and including all values in the inner 95% quantile[82]. Table 11 below shows the point estimates and confidence intervals of economic values for each attribute tested in the study as percentages of the purchase price based on the regression of the aggregated data and based on 1,000 groups of 10 draws. The coefficients of all relevant attributes are significant across all 1,000 regressions. The economic loss for combinations of the attributes can also be calculated based on the coefficients from the regression analysis, by applying a simple formula. Appendix 4 lists the estimated damage and the lower and upper bound of the confidence interval for all possible combinations of the claims.

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[81]   Orme, B. K. & Chrzan, K. *Becoming an Expert in Conjoint Analysis.*: Sawtooth Software, Inc, p. 183.

[82]   The 2.5th percentile was chosen as the lower bound and the 97.5th percentile was chosen as the upper bound. This interval contains 95% of all data points and is a non-parametric 95% confidence interval.

Table 11: Point Estimates of Economic Value with 95% Confidence Intervals

| | Attribute | Aggregate Regression | | | |
		Point Estimate	Lower Bound	Upper Bound	P-Value
Survey 1: Acana Misrepresentations	Biologically Appropriate	9.5%	6.4%	12.5%	1.08E-08
	Whole Prey	8.4%	5.4%	11.4%	2.93E-07
	High Palatability	9.8%	6.7%	12.8%	4.08E-09
	Fresh	14.0%	9.8%	18.0%	1.62E-09
	Fresh & Regional	14.1%	9.9%	18.1%	1.14E-09
	Regional	11.6%	7.4%	15.7%	3.64E-07
	Delivering Naturally	11.8%	8.7%	14.7%	5.54E-12
Survey 2: Acana Omissions	Preservatives	12.0%	8.9%	15.0%	1.87E-11
	Expired	28.7%	25.5%	31.8%	4.01E-32
	Heavy Metals	57.8%	54.2%	61.2%	4.32E-46
	BPA	38.7%	35.3%	42.0%	2.49E-39
	Regrinds	14.5%	11.4%	17.5%	5.32E-15

Source: BRG analysis of conjoint study responses.

**Table 12: Economic Loss Confidence Intervals Based on Draws**

	Attribute	Regressions by Groups of Draws			
		2.5%	50% (Median)	97.5%	Number of Regressions with Significant Coefficient
Survey 1: Acana Misrepresentations	Biologically Appropriate	0.087	0.096	0.105	1000
	Whole Prey	0.077	0.085	0.093	1000
	High Palatability	0.09	0.099	0.107	1000
	Fresh	0.128	0.14	0.154	1000
	Fresh&Regional	0.13	0.141	0.155	1000
	Regional	0.103	0.116	0.13	1000
	Delivering Naturally	0.109	0.118	0.128	1000
Survey 2: Acana Omissions	Preservatives	0.093	0.119	0.145	1000
	Expired	0.262	0.286	0.309	1000
	Heavy Metals	0.547	0.577	0.607	1000
	BPA	0.359	0.386	0.411	1000
	Regrinds	0.116	0.145	0.172	1000

Source: BRG analysis of conjoint study responses.

166.   I checked the reasonableness of my damage estimates by comparing the prices of Defendants' products to prices of non-premium dog food. For example, while Pedigree does not sell 25lb bags, an online retailer offered a 17lb bag of Pedigree dog food for $12.60, and a 33lb bag for $19.99 (Figure 8).[83] This implies an average price of $16.30 for a 25lb bag of Pedigree. In contrast, a 25lb bag of Acana Meadowland is priced at $73.99 - a 78% price premium over a Pedigree product of similar weight.[84] The misrepresentations and omissions analyzed in this study would erase many if not all benefits consumers perceive Defendants' products to have over non-premium products like Pedigree. The damage estimates in Figure 14 and Table 15 indicate that the perceived value of products without the misrepresentations and without the omissions would be similar to the price of non-premium products like Pedigree.

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[83]   https://www.chewy.com/pedigree-adult-complete-nutrition/dp/141438, accessed January 28, 2021

[84] $16.3 = \frac{12.60 + 19.99}{2}$; $78\% = \frac{73.99 - 16.30}{73.99}$

Figure 8: Prices for Pedigree at Chewy
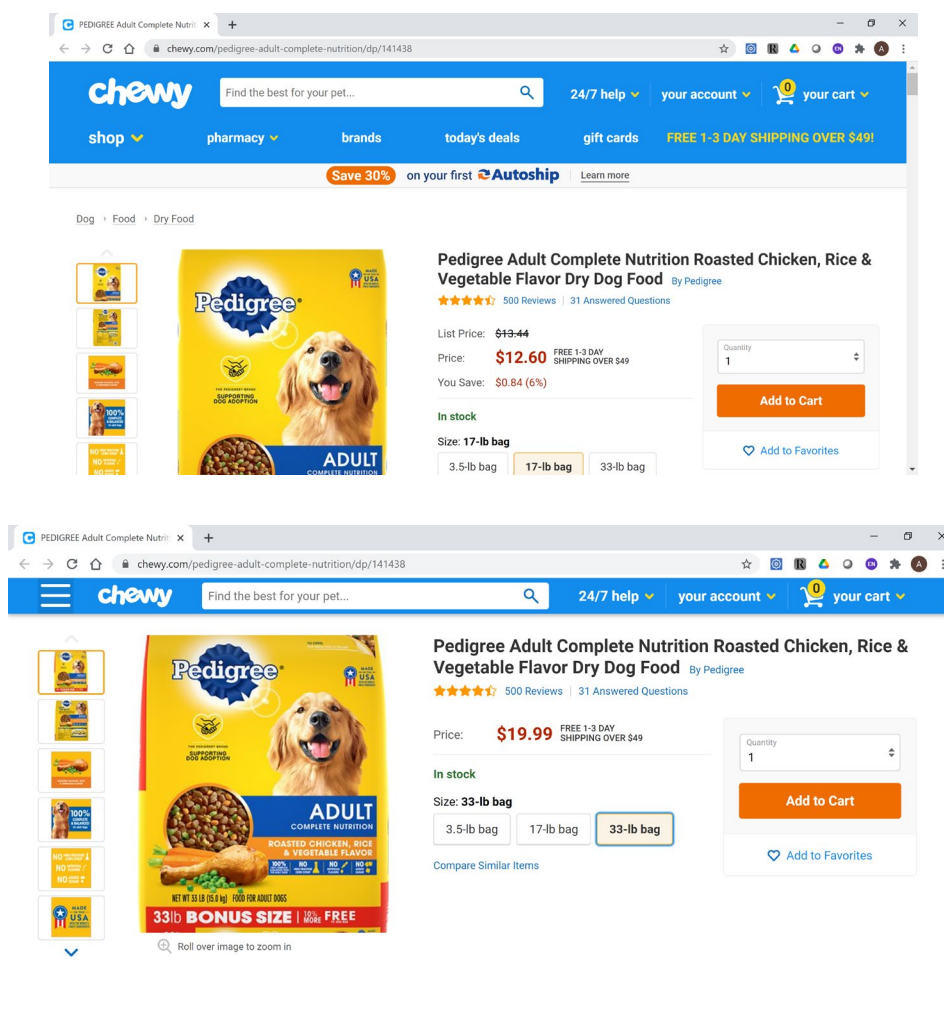
Source: https://www.chewy.com/pedigree-adult-complete-nutrition/dp/141438, accessed on January 28, 2021

7   Class-Wide Damage Estimate

167.   In Section 2.2, I had estimated the retail sales related to Products at Issue during the class period in New York. In Section 6.4 I had applied market simulations to estimate damages per unit as a percentage of the purchase price. Together, these two values allow me to estimate a range for class-wide damages. I am able to estimate class-wide damages for specific claims or a combination of claims.

168.   Table 13 shows the median as well as the lower and upper bound of class-wide damages for misrepresentations and omissions assuming that all respective claims are included in the class-wide damages.

Table 13: Range of Class-Wide Damages

Brand	Claims	Defendants' Revenue	Estimated Retail Revenue in New York	Damage in %			Damage Range		
				Lower Bound	Median	Upper Bound	Lower Bound	Median	Upper Bound
Acana	Misrepresentation	44,621,484	2,751,658	23.03	31.42	38.9	633,707	864,571	1,070,395
	Omission			80.43	84.24	87.31	2,213,159	2,317,997	2,402,473
	Total	**44,621,484**	**2,751,658**				**2,846,866**	**3,182,568**	**3,472,868**

Source: BRG analysis of conjoint study responses.

8   Expectation Survey

169.   In addition to the conjoint surveys described above, I conducted an expectation survey which 1) to measure consumer perception regarding the misrepresentations and omissions at issue; and 2) to assess the extent to which those misrepresentations and omissions have a material impact on consumer purchase interest.

170.   As with the conjoint surveys, I commissioned Amplitude to conduct a survey with Internet panel using a questionnaire I had designed.

171.   To select a sample that adequately represents the class members, survey respondents were only included in the survey if they met the following criteria:

   c.   Respondents are 18 years or older;

   d.   Respondents live in the United States;

   e.   Respondents or a close family member are not working in advertising agency or market research;

f. Respondents or a close family member are not working for a company that manufactures or sells dog food;

g. Respondents have had at least one dog in the past 3 years;

h. Respondents have purchased, or were involved in the purchasing decision, of dry dog food in the past 3 years;

i. Respondents have purchased dog food from at least one premium dog food brand in the past 3 years.[85]

172. A total of 242 respondents participated in this survey. Table 14 describes the demographics of the survey participants.

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[85] The list of competitor premium dog food was identified from a variety of sources: CPF1813214, slide 72; CPF1767531; and identified as "Competitors" in Expert Report of Dr. Robert H. Poppenga, DVM, PhD, DABVT, dated August 06, 2019, Scott Weaver v. Champion Petfoods USA Inc. and Champion Petfoods LP, United States District Court Eastern District of Wisconsin Milwaukee Division, Case No. 2:18-cv-1996-JPS.

Table 14: Expectation Survey Demographics

Category	Level	Count	Share
Gender	Male	94	38.8
	Female	148	61.2
Age	18 - 29	20	8.3
	30 - 44	75	31
	45 - 59	88	36.4
	60 or higher	59	24.4
	Below 18		
Household Income	Less than $25,000	14	5.8
	$25,000 to $34,999	21	8.7
	$35,000 to $49,999	35	14.5
	$50,000 to $74,999	43	17.8
	$75,000 to $99,999	37	15.3
	$100,000 to $149,999	54	22.3
	$150,000 or more	33	13.6
	Prefer not to answer	5	2.1
Education	Less than high school	1	0.4
	High school	25	10.3
	Some college	68	28.1
	Bachelor's degree or higher	148	61.2
Pet Information	1	153	63.2
	2	59	24.4
	3	21	8.7
	4 or more	9	3.7
	None		
Clear Understanding	Yes	237	97.9
	No	5	2.1

Source: BRG analysis based on Expectation Study responses

173.   After viewing the image of the Acana study product (the same products used in the conjoint study), all respondents were instructed[86]:

> *We are interested in your expectations as to the dog food you just viewed.*
> *Based on what you recall from the dog food packaging you just reviewed,*

[86] Survey screenshots are included in Appendix 1.

> *please select the one response closest to your opinion. If you don't know or*
> *are not sure, please indicate so.*

174.   Next, all respondents were shown the image again and asked follow-up questions. Figure 9 through Figure 14 show the respective question in the caption and the results in the figure.

175.   The results indicate that a significant portion of consumers interpret the Products' packaging to be misleading, assuming Plaintiffs' allegations are true. For example, from "fresh" statements of the packaging, 84.7% of respondents either agree or strongly agree that the advertised dog food does only contain fresh ingredients unless otherwise specified (Figure 9).[87]

176.   The survey results also show the impact of misrepresentations and omissions on the purchase intention of the dog food consumers. For example, 67.9% to 77.5% of respondents would be more likely to purchase the dog food bag shown if it did not contain BPA, pentobarbital, heavy metals, regrinds, or expired ingredients, respectively.
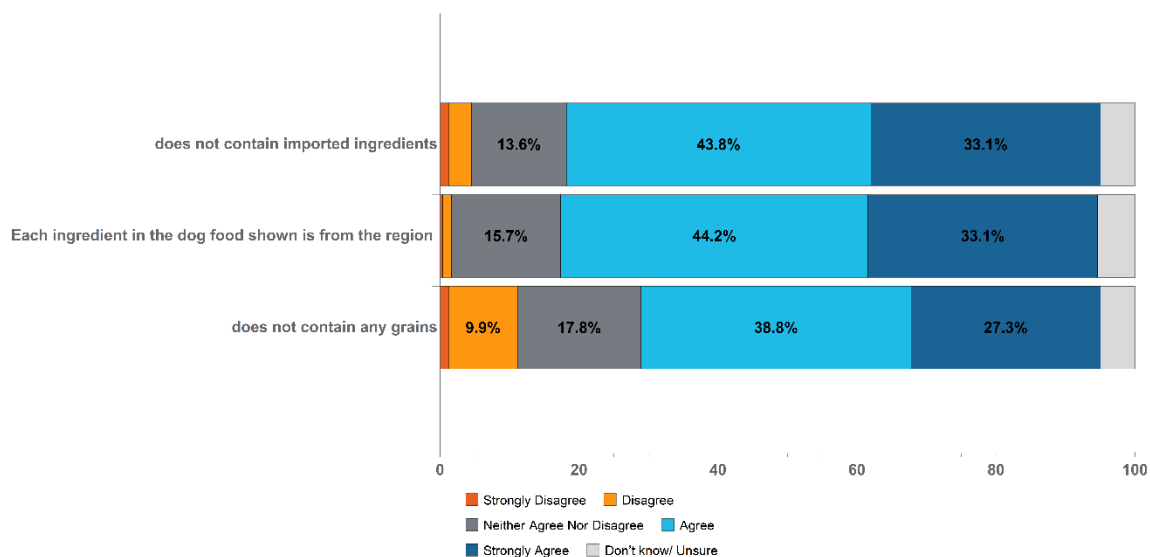
Figure 9: From the "Fresh" statements on the dog food shown, I would expect that the dog food shown...
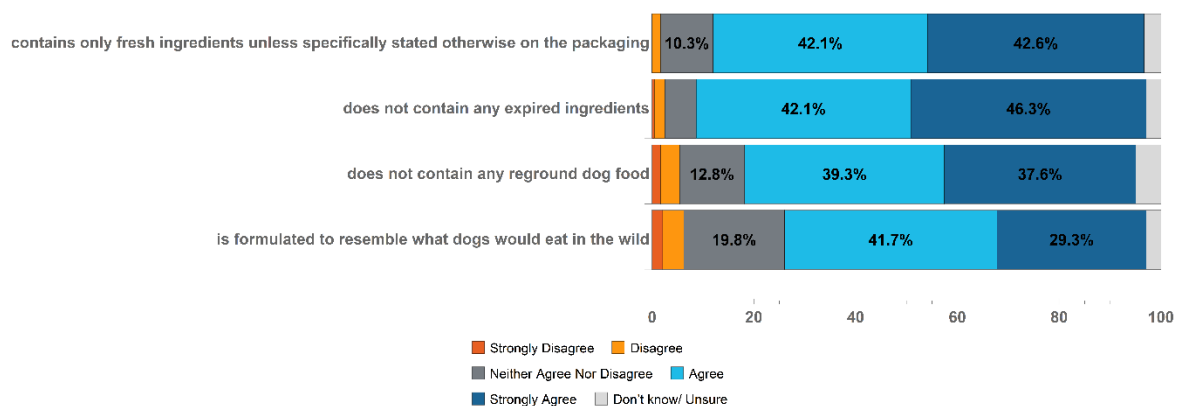
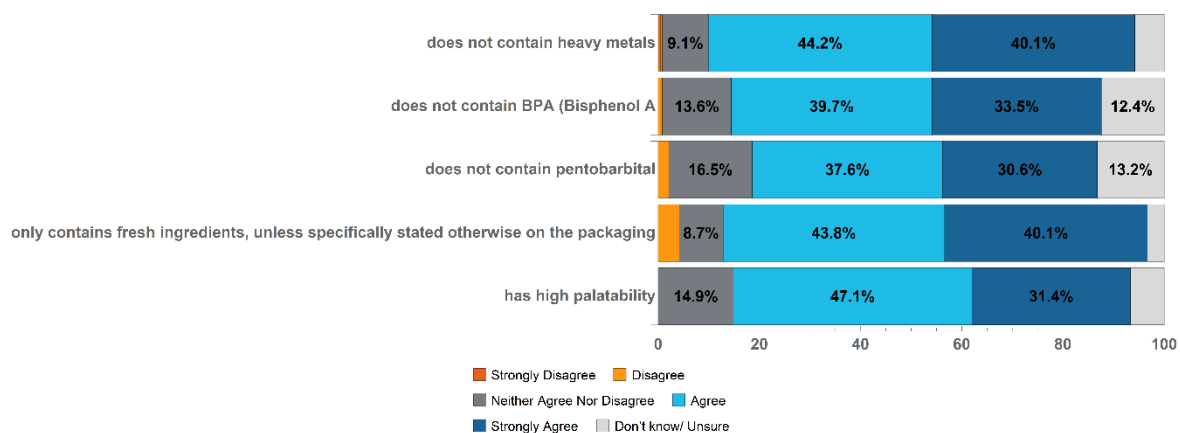*Source: BRG analysis based on Expectation Study responses*

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[87] $84.7 = 42.6 + 42.1$

Figure 10: From the "Regional" statements on the dog food shown, I would expect that the dog food shown...
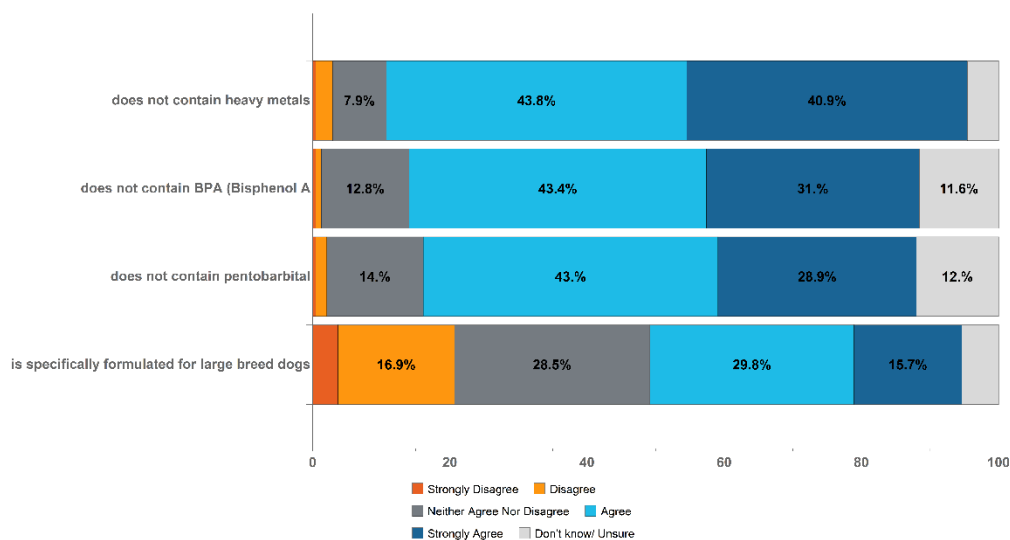

Source: BRG analysis based on Expectation Study responses

Figure 11: From the "Biologically Appropriate" statements on the dog food shown, I would expect that the dog food shown...
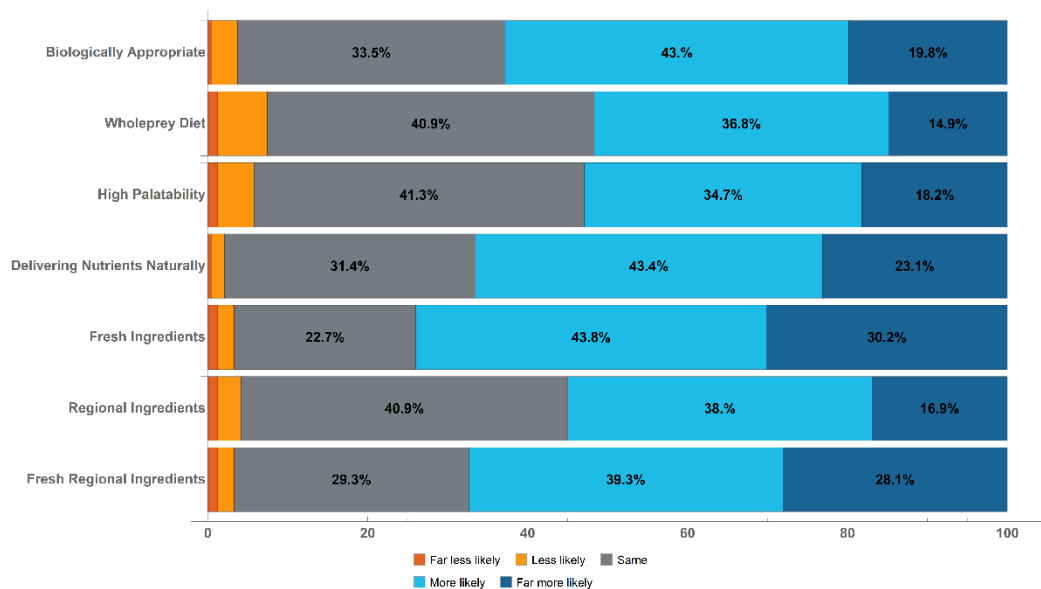

Source: BRG analysis based on Expectation Study responses

Figure 12: From the "Delivering nutrients naturally" statements on the dog food shown, I would expect that the dog food shown...
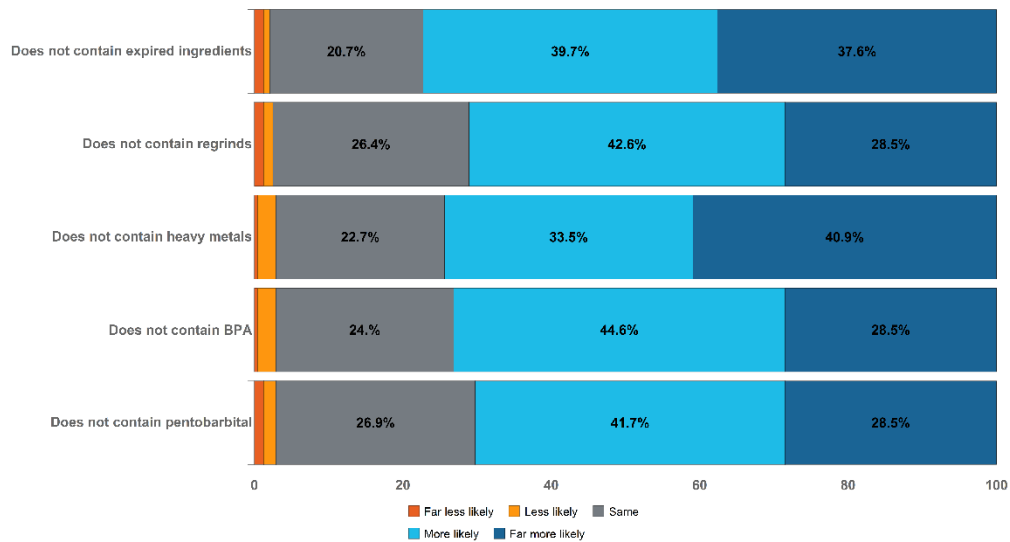

Source: BRG analysis based on Expectation Study responses

Figure 13: All else equal, does each label below make you more or less likely to purchase the dog food shown?

Source: BRG analysis based on Expectation Study responses

Figure 14: With regard to the dog food bag shown, if one or more of the following were true, would you be more or less likely to purchase the dog food shown?

Source: BRG analysis based on Expectation Study responses

9   Summary and Conclusion

177.   In this report, I introduced a theoretical economic model that shows how the demand for a product changes when attributes and levels of attributes for that product change. If the change in a product's attributes makes the product less desirable in the eyes of the consumer then the consumer's demand curve shifts downward resulting in lower prices and less units sold.

178.   I further introduced the empirical, survey-based methodology of CBC as a reliable way to quantify the change in demand when the attributes of the product change (e.g., when claims about the product are false and misleading or when important information is omitted). I discussed how the well-established scientific methodology of Mixed Logit modeling and Hierarchical Bayesian Estimation can be used to analyze the data from the efficiently designed choice based Conjoint Analysis. The results from the conjoint analysis can be relied upon to draw inferences about the value of attributes to customers at the point of purchase and how such values will change when previously concealed misrepresentations or omissions are revealed to the consumer at the point of purchase,

179.   I designed two separate surveys (an omission survey and a misrepresentation survey) that enable the computation of the economic impact for a misrepresentation of a group of misrepresentation and an omission or a group of omissions on consumers who are in the process of purchasing Acana branded products.

180.   The results from the surveys showed that all of the misrepresentations and all of the omissions tested would result in an economic loss to the consumer when the truth would be revealed at the point of purchase (i.e., that certain facts were misrepresented and that certain facts that would make the product inferior were omitted). Further, the model enabled me to compute economic losses for individual misrepresentations, groups of misrepresentations, individual omissions, and groups of omissions.

181.   Based on the estimated demand curves, the economic losses were quantified in a market simulation as a percentage of the purchase price which makes them well suited for determination of class-wide economic losses. In this report, I gave numerous examples of how to use the results from the conjoint analysis to calculate the dollar value of economic losses for price points charged by Champion in the Actual-World.

182.   As described in the examples of the economic loss calculation, class-wide damages can be computed by obtaining:

   a.   the retail revenue of the at-issue products in the Actual-World, which can also be derived from the retail prices paid by consumers and the number of bags sold,

   b.   the misrepresentations and omissions that the Court find Champion liable for,

   c.   multiplying the percentage economic loss with the price charged for the at-issue product, and the retail revenue in the actual world, and

   d.   sum the losses per product across all at-issue products.

183.   If the Court finds Champion liable for the misrepresentations and omissions, the economic losses presented in this report are similar to the price premium for Acana products over non-premium brand products, such as Pedigree as shown in Paragraph 175 above. Therefore, the results of my conjoint study are reasonable and reliable.

184.   The expectations survey that I designed and implemented demonstrated that consumers are misled by Champion's packaging misrepresentations and omissions and that the misrepresentations and omissions have an impact on the purchase intention of consumers.

Respectfully submitted on February 24, 2021

Stefan Boedeker